



**The Independent Guide to  
IBM Personal Computers**

Volume 1, Number 3

\$3.00

# GARY KILDALL

The Man Who Created CP/M<sup>®</sup>

**IBM Announces  
CP/M-86**

**WordStar Released**

**Baby Blue, Using  
Data Files, FORTH,  
Hundreds of New  
Products**

PLUS: Adam Osborne  
& David Bunnell tell you how  
NOT to buy a Micro



WANT TO SELL YOUR  
**Used Apple?**  
SEE P. 72





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**More tools for IBM.** Microsoft wrote PC-DOS, the standard operating system for the IBM Personal Computer. And Microsoft is first in providing a full range of languages, applications programs and utilities for the IBM PC. The addition of RAMCard with RAMDrive is our way of saying that Microsoft will continue to offer more and better supported tools for the IBM PC.

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### What's in store?

So to keep up with modern times, visit your authorized IBM Personal Computer dealer today.

Ask what programs are available now. Get a demonstration.

#### IBM PERSONAL COMPUTER SPECIFICATIONS

<b>User Memory</b> 16K, 256K bytes*	<b>Display Screen</b> High resolution* 80 characters x 25 lines Upper and lower case Green phosphor screen*	<b>Permanent Memory</b> (ROM) 40K bytes*
<b>Microprocessor</b> 16-bit, 8088*		<b>Color/Graphics</b> Text mode: 16 colors*
<b>Auxiliary Memory</b> 2 optional internal diskette drives, 514", 160K bytes per diskette	<b>Operating Systems</b> DOS, UCSD p-System, CP/M-86†	<b>Graphics mode:</b> 4-color resolution: 320h x 200v* Black & white resolution: 640h x 200v* Simultaneous graphics & text capability*
<b>Keyboard</b> 83 keys, 6 ft. cord attaches to system unit*	<b>Languages</b> BASIC, Pascal, FORTRAN, NAFRO Assembler, COBOL	<b>Communications</b> RS-232-C interface Asynchronous (start/stop) protocol Up to 9600 bits per second
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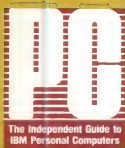
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**IBM**



## The IBM Personal Computer A tool for modern times





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# Letters To PC

## PC Sells a PC

I have been in the market for a good personal computer for several months, and have been trying to digest the brochures and articles describing the various products currently on the market. Your magazine unequivocally sold me on the IBM Personal Computer, better than any sales brochure could or would. The interview with Bill Gates and your section "Taking the Measure" were superb. It gave me a thorough insight into the thought that went into the design of the computer and its software.

After reading your magazine, I went right out and placed an order for the IBM Personal Computer, and am now eagerly awaiting delivery.

J.L. Arps, President  
Arps Petroleum Company  
Bellevue, Washington

## A Bet "On the Come"

Bravo, your first issue is outstanding. We are, so to speak, babes in the wood as to computer knowledge and found many wolves out there in the marketplace. Through a long, agonizing search, we decided to obtain the IBM PC (because it is clearly the best micro on the market) and leave ourselves adrift without the software we really wanted, such as SuperCalc, WordStar, SpellStar, and MailMerge, gambling that either CP/M-86 would be available soon enough or that those items would be rewritten in PC-DOS.

Arthur O. Carmichael, P.E.  
Livonia, Michigan

Your "gamble" has paid off. This issue carries reports on lots of new products, including CP/M-86 and a plug-in board that lets you run WordStar and MailMerge.

## Monochrome Mistake—Two Views

"The Monochrome Mistake" (PC, April-May, 1982) is very misleading in outlining the relative advantages of color vs. monochrome displays. Color displays are great, all else being equal. Unfortunately, all else is not equal. There are good

reasons why "business" software generally is not designed to use color displays on the IBM PC or any other computer.

Obviously, color displays convey more information, which, in computer terms, means memory. For a monochrome display, each small dot forming a character is either on or off. However, for a color display each dot also has some color attribute, which uses more memory. The practical result is that the characters produced by IBM's color display have only about half the number of dots available (64 vs 128) to form a character as the monochrome display, and that means that color display characters are harder to read.

Another problem related to how easy it is to read the screen is the quality of the video display itself (TV or monitor). Color video is produced by scanning the surface of the picture tube with three electron beams, which must be perfectly aligned to produce high resolution. Black and white, with only one electron beam, has no such alignment problem. It is a fact that even a very expensive, studio-quality color monitor cannot match the resolving power of a relatively inexpensive black and white monitor.

For business applications, you need the best display quality you can get, because someone will have to look at it eight hours a day. With present technology, it just is not possible to equal the quality of a monochrome display for any reasonable amount of money, so I will continue to recommend against color for business applications. Compare them yourself—anyone can see the difference.

Burks A. Smith  
Datasmith Micro Software Systems  
Shawnee Mission, Kansas

Jim Edlin responds: Screen resolution is a valid concern, but it's color graphics, not color text, that really demands extra memory. I use a color display (not on a PC yet) several hours a day for word-processing and wouldn't trade back for the world.

Bravo for "The Monochrome Mistake" (PC, April-May, 1982)! We at IDETIK

Corporation agree with Jim Edlin's point of view. Color has a lot of potential and we are one of the few manufacturers to capitalize on it. We offer a board for the Personal Computer which has high resolution, 16 colors, and other features too numerous to mention. Let's hear it one more time for using the graphic potential of the Personal Computer!

Huron Smith  
IDETIK Corporation  
Madison, Wisconsin

## Minimal Configurations

Please don't sniff or look down on those who own minimal configurations. My 5150 is a 32K system, and I am quite happy with it. Not everyone can plunk down \$4,000+ for disk drives, printers, extra memory, etc., at least not all at once.

Charles A. Miller  
Atlanta, Georgia

PC is on equal opportunity mogozine. We do not discriminate on the basis of memory, disk drives, or software origin.

## Chip on Chips

Your "PC Production Guess" (PCom-muniques, February-March, 1982) was an embarrassment. A couple of electronic trade magazines have already disclosed another IBM product which uses the Intel 8088. That information is months old, as a matter of fact.

Disclosure of "maybe's" is warranted when verification is impossible. However, advertising ignorance is not what a potentially great periodical should be doing in its infancy.

L. Chip Getter  
IBM Corporation  
Tarrytown, New York

We don't knowingly advertise our ignorance. If you could give us the real number, we wouldn't need to speculate. However, we appreciate it when our readers point out our goofs. Thanks.

## Electronic Mail

This is my first time on (CompuServe's) Micronet, and I appreciate the fact that you provided your user's number to write



## Letters

to. I just had to write my first electronic missive to you.

Gary L. Jackson  
Hermosa Beach, California

We like to practice what we preach. CompuServe subscribers can reach our editors at 70370.532 and Source mail can be sent to ST0948.

### End-to-End Makeup

I've had your PC about a month and mine about a month, and I love them both. I would like to add some positive reinforcement to something that I really appreciated. Not one of your columns ended with a "continued on page #." I could read through your whole magazine without having to flip back and forth 67 times. Please keep up the good work.

Jim Schings  
Canton, Michigan

We're pleased you noticed. Publishers call it "end-to-end makeup" and it sometimes makes our lives a little more difficult, but we think it's worth it. Glad you agree.

### Article Ideas

A suggestion: No doubt among your readers there will be more or less complete neophytes who have elected to use the IBM Personal Computer as their initial machine for entry into the computer experience. For those who have not "worked their way up" and acquired familiarity with computers previously, using the IBM and its documentation may be like learning to fly in the Space Shuttle!

A helpful department might be "Learning to Use the Personal Computer" (or some such title) in which various commands, statements, and functions that are available on the system would be explained in more detail than that in the manufacturer's documentation and interesting, illustrative programs presented in which these capabilities are documented.

Albert R. Frederick, Jr., M.D.  
Boston, Massachusetts

We haven't got a formal department title yet, but articles of this type will be a staple of our content. See Lon Poole's article (PC,

April-Moy, 1982) on "Using Color Graphics" for starters.

IBM's entry into personal computers has been late. However, those of us who anticipate significant progressive and innovative developments from them find ourselves frustrated in not knowing what plans lie ahead in terms of both hardware and software. Companies other than IBM have, or suggest, available materials which are adaptable. I, for one, would be willing to defer acquisition, knowing a particular item was in the throes of development. It would be my preferred choice rather than adventuring into potentially unexplored turf. Therefore, if IBM is reluctant to formally publish its project calendar, could PC interject one of its own?

R.M. Jarrett  
West Hollywood, California

IBM is understandably tight-lipped about its unreleased products. Our New On The Market section contains information on almost everything we know about, and PCCommunicates shares gossip, rumors, and speculations.

### Communication Correction

Clifford Barney's comment ("Communications Briefs," PC, April-May, 1982) that CompuServe's electronic mail is "only slightly expensive" is misleading, and certainly does not do justice to CompuServe. First of all, CompuServe's non-prime time rates (\$5) start at 6 p.m. so you have three hours during which they are cheaper than the \$7 mentioned there for Teletext. The non-prime-time rate continues until 5 a.m. Those are the user's local times. Secondly, there are "several" bulletin boards by special interest groups that provide "computer conferencing," as defined on page 58 of the same issue of PC. For example, MUSUS is a bulletin board for members of the UCSD Pascal User's Group to which I belong and regularly conference with others. Another group is devoted to CP/M Operating System problems and interests. There are many other features which I will not mention. There is

a one-time cost of \$19.95.

Gena Gingerich  
Santa Barbara, California

### Boca Boo-Boo

I have just finished reading the second issue of PC magazine, and you and your staff can certainly be proud of the magazine.

I know you were introduced to many IBMers associated with the Personal Computer when you visited us. However, while David O'Connor is indeed an "extremely bright and articulate fellow" ("Boca Diary," PC, April-May, 1982) and had responsibility for the architectural design of the Personal Computer, it was not he who you met; it was David Bradley, manager of Systems Architecture.

Jeannette A. Mahar  
Communications  
IBM  
Boca Raton, Florida

My apologies to both Mr. O'Connor and Mr. Bradley. DHB

### No Computerese, Please

I originally purchased an IBM PC in response to my young son's desire to have a computer "like everybody else in the neighborhood and school." He wanted an Apple but I held out for a more traditional name. His primary interests were amusement, games, and just fun. After reading your first issue, I realized there may be some business application for me as well.

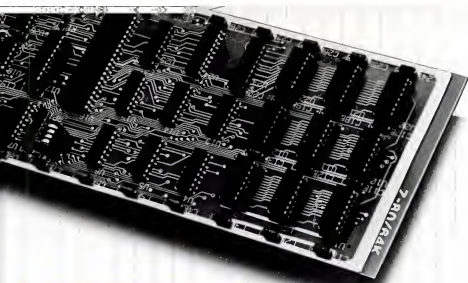
Our request of you: Please don't forget that some of your readers are not computer specialists, freaks, or even very knowledgeable in the world of RAM, ROM, DOS, BITS, BYTES of infinitum. Remember that some of us are civilians and need to be patronized.

A. Dean Lynn  
Tarzana, California

Request granted: We couldn't agree more with your comments about "computerese."

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As the chart shows, there's nothing else like Concurrent CP/M-86 in the microcomputing world, and only Digital Research offers it. For information, call or write Digital Research Inc., P.O. Box 579, 160 Central Ave. Pacific Grove, California 93950 (408) 649-3896.

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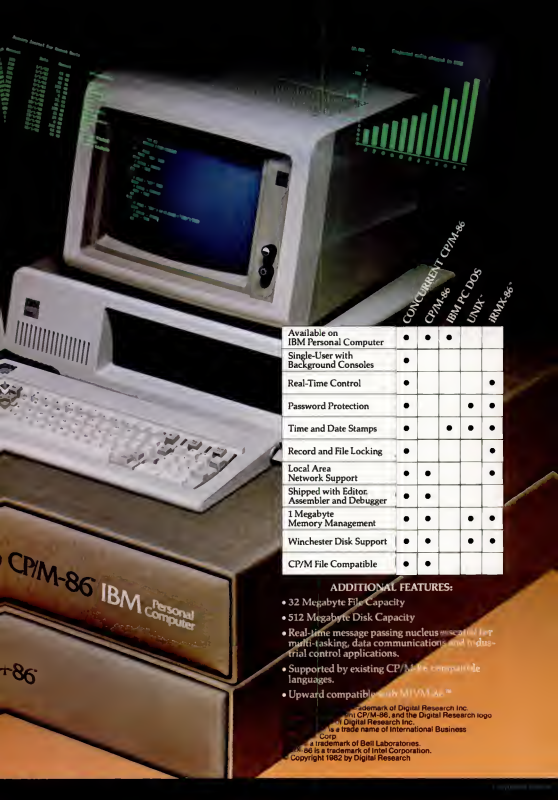
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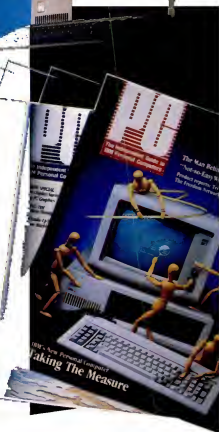
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# For Ten Minutes PC Was Free

**F**eeling strongly that PC is well worth its cover price, I have resisted most suggestions to give copies away—even for promising promotional reasons.

During the recent West Coast Computer Faire, however, there were a few frantic moments when, for the sake of human safety, I had to throw my magazine principles into the wind.

For those who don't know, the West Coast Faire, held annually in San Francisco, is by definition a consumer trade exhibit that features microcomputers and all sorts of microcomputer-related products. But it is also much more.

Located just north of Silicon Valley, the heart of "microdom," the West Coast Computer Faire, more than any other event I know of, captures the spirit and points the future direction of personal computing. It is a happening in which entrepreneurial upstarts and the established vendors of personal computing products are deluged by hordes of hobbyists, business people, professionals, educators, students, and many others representing every sex, race, and age.

During the three days of this year's Computer Faire, some 40,000 people crammed down row upon row of exhibits in two giant exhibit halls, and filled to overflowing capacity the seminar rooms located on four floors.

PC magazine was there, of course. We rented a triple booth from which, once we finally got them, we sold a ton of magazines. Our Faire experience was one of woe and frustration followed by moments of triumph. In other words, it was a typical PC tale, the likes of which we've shared with our readers before.

Perhaps you've noticed that this issue of PC is perfect-bound like a book instead of stapled together like the first two issues. Herein is the clue to the problem.

PC has grown much faster than anticipated. We originally thought our charter issue would be 48 pages, but it was 100. After issue two (148 pages) was printed, our printer discovered that it was too fat to be easily bound and stapled by his equipment.



**S**TILL MORE  
*people were crowded in.  
 Suddenly it looked to me as if the  
 counter of our booth would  
 collapse and we would be crushed  
 by the resulting stampede.*

Afterwards, more than one person said they wished they could have seen a bird's-eye view of the resulting riot. The announcement, which was heard throughout the show, caused thousands of people to stop dead in their tracks. Then they headed for the PC booth.

Behind the counter of our booth was a contest drum into which were stuffed the 50,000-plus entries of people who over the course of the previous months had entered the "Win a PC" contest. Twelve-year-old Jennifer Poltier was positioned to pull out the winner.

Some people wanted to know if it was too late to sign up (which, of course, it was). Crowds of people arrived at the booth to see what was going on.

Binding problems created an unforeseen delay in getting the issue to the show, which caused the PC staff to have heartburn for the first day and a half of the Faire.

If you knew the details, you'd understand why it was miraculous that the magazines arrived about 12:30 a.m. on the second day of the show (Saturday).

From that point on, the Faire experience was much more gratifying. PC magazines sold as fast as we could handle the transactions.

Saturday night PC had fun as we toured the Computer Faire Party Circuit (CFPC). Following a few brief stops at wine and cheese affairs in assorted hotel suites, we hit a real winner—the Microsoft party, held in an elegant Victorian mansion. This event featured plenty of fabulous food, a flowing bar, and lots of old rooms to explore, to say nothing of a lively crowd dotted with many of my old microcomputer chums.

For the PC crew the real highlight of the Faire came on Sunday—the final day—when we held the PC drawing for our IBM Personal Computer contest. First, we had the drawing announced over the Computer Faire's public address system. The announcement said that PC magazine at booth such and such would be giving away an IBM Personal Computer in 20 minutes.







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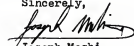
During our many years in the computer graphics business we have found no substitute to direct customer contact, for matching our technical skills with the needs of our users. We consider your suggestions invaluable, and are very interested in hearing from you regarding the graphics features and functions that you would like our product to provide, and even your intended applications.

Here is a great opportunity for you to tell us what turns you on -- graphically speaking. Your input can directly influence future designs in computer graphics, and help you get the kind of capabilities you really want.

In gratitude for your contributions, we will give away three of our new IBM PC graphics generators, hot off the production line: one to the most comprehensive response, one to the most imaginative suggestion and one to the most practical idea.

Please let us hear from you by July 15, 1982 since we do wish to have our product in your hands as soon as possible.

Sincerely,



Joseph Meshi  
General Manager

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# PC Power

**F**or computers too, anatomy is destiny. What a computer can achieve depends on how it is built.

Much of what has become conventional in computer programs was dictated by limitations of yesterday's hardware. The reasons are gone but the conventions survive because computer programmers are comfortable with them.

Programs that don't dispense with outdated conventions make you work and think harder than you need to. This is true for all sorts of programs but is easily seen in the case of word-processing. Take the "insert" function found almost universally in word-processing programs. The insert function dates from a time before word-processing was done on video screens; you edited on paper with a terminal that slowly clacked out copy. To insert something in your text, you "played out" your text on paper to the point at which you wanted to make the insertion, shifted to "insert mode," typed your addition, then switched insert mode back off and played out the text to the point of the next change.

The constraints of that hardware design also explain why deletion in word-processing typically works forward in your text rather than in the more intuitive backward direction. On a system with an ink-and-paper terminal, you would play out text to the point of deletion, shift to delete mode, delete as much material forward of your working position as you wished, then shift out of delete mode again. You couldn't delete backward no matter how logical that might seem, because what you wanted to delete was already there in real ink on your paper. The limitations of the hardware demanded that you learn a new layer of habit contrary to intuition.

Today, when the text in progress is in ephemeral video instead of permanent ink, there is no need to have a special insert mode or a counter-intuitive deletion procedure. You can simply "go" where you want in your text and make the desired change.

The next generation of systems could have let you insert without a special mode,



***P***ROGRAMS  
that don't dispense  
with outdated  
conventions make  
you work and think  
harder than you  
need to.

but they couldn't show you your revised text in correct form as you changed it. You had to use a "reform" function after changes. The reason: These systems, though they used video display, used it in the form of terminals, which are devices separate from the computers to which they are attached. Even the fastest terminals take 2½ seconds or so to completely rewrite a full screen. Since people can type a lot faster than that, a terminal screen could never keep up with the changes. Computers such as the PC don't use terminals. Their display is integral with the com-

puter's memory and can be completely changed in 1/30th of a second—so you can see the form of your text adjust as you type in changes. The widely used "reform" function becomes a dinosaur.

Then there are functions such as underlining and boldface type. Older computers have to show you the presence of such emphasis by displaying code symbols around the emphasized text. The PC can show you underlining and boldfacing by doing so on the screen. Any word-processing program that doesn't (most of them so far) is guilty of wasting PC Power.

Worse are programs that screw up through a failure to provide for PC Power. IBM has designed keys that automatically repeat the function as long as they are held down. This is fine in normal typing, but it can be disastrous when the keys are used to command program functions and an absent-minded user holds one down while lost in thought. You could easily end up in limbo while your text file is saved on disk 20 times in a row. IBM lets programmers switch repeat-action off or on key by key, and any program which fails to do so at the appropriate times is unworthy of PC Power. In the same way, programs should set the state of the number/cursor keys via software in anticipation of how a user will need to employ them at given stages of the program.

The PC Power list goes on for all types of programs: function keys, large memory, color and graphics, multifont printing...

Before you buy software, examine it with care. If it attempts to foist anachronisms like "reform" commands and "insert" modes upon you, proclaim PC Power to the marketplace by declining to buy it. (Note that even IBM doesn't always honor the power of its new machine—witness the counterproductive "insert" key they provide.) IBM Personal Computers command a premium over machines further from the state of the art. If you have paid this price, you owe it to yourself to insist on software that justifies it. You owe it to yourself to reject software that does not exploit PC power.



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# PCommuniques

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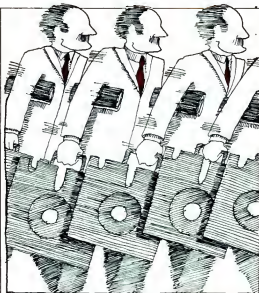
## No PC at OAC

At the national Office Automation Conference (OAC) in San Francisco last April, IBM had a large and handsome exhibit booth, but the Personal Computer was nowhere to be seen in it. How come, you may wonder? After all, isn't the PC touted by many as IBM's first crack at the elusive "office work station"? (Xerox exhibited its personal computer as a candidate for that role.) The PC's banishment, one source told PCommunique, was decreed by an unnamed executive at IBM headquarters, out of fear that the PC would steal the show. This exec reportedly worried that crowds would flock around the PC if it were exhibited, and thus give short shrift to the more expensive wares ("boat anchors like the 8100," according to our source), which IBM is selling far less quickly than PCs. So, why no PC at OAC? If our source is accurate, Cinderella would have understood perfectly.

## Portable PC?



The computer pictured above, which was a big draw at the OAC, is not an IBM product. It is the Compass computer from Grid Systems Corp.—an \$8,200 portable wonder with a flat, fold-down display. It does, however, have



some interesting points in common with the IBM PC. Consider these: 8086 processor with 8087 mathematics coprocessor, 256K of memory, and a display with 320 by 240 graphics resolution—no color, though. (The Compass also includes a 1,200 bps phone connector, 256K of bubble memory to take the place of disk storage, and a bunch of custom-developed software. It is designed to connect via networks to a variety of central computers, which Grid Systems also provides for its main data storage.)

## Graphics on Monochrome; OCR for Free

If you have both the monochrome and color/graphics display adapters for

your IBM Personal Computer, you may already have discovered that, though both have identical 9-pin connectors, the IBM monochrome monitor remains blank if plugged into the color/graphics connector. It can, however, be made to work with the graphics card by wiring pin 7 of the monitor plug to the center connector of the round, composite-signal jack. See the Option Installation Manual to set the switches inside the system unit so both color and monochrome adapters are selected. The monochrome display will show minor distortions due to the different video frequencies it is designed for, and you won't get color, but it's a usable stop-gap arrangement.

Also, did you know your PC has pattern recognition software built into a part of the

operating system? It is used when the color/graphics adapter is set to graphics mode and a BASIC program tries to read text from the screen. A built-in subroutine compares the dot pattern of shapes on the screen to the patterns stored for generating characters on the screen. This is the same principle used in some optical character recognition (OCR) systems, and works fine as long as you haven't drawn something on top of the characters you want to read from the screen. (See page A-61 of IBM's Technical Reference Manual for more about this cute trick from the folks at Microsoft.)

—Mark Dionne,  
Solid Software,  
Newton, Massachusetts

## Semi-Hard

What good does 256K of memory do your computer if you don't have software capable of using it? What good does software capable of using 256K of memory do you if you have only 64K in your computer? Ah! That's the kind of question that put Sears together with Roebuck, Simon with Garfunkel, and strawberries with cream. Now it has brought together Sorcim Corporation, a publisher of software, and Viste Computer Company, a maker of memory boards. The fruit of their union is called "SuperCache"—a packaged combo of 192K memory expansion for the IBM PC and a financial modeling program that can fill up all those extra cells. The proud partners claim the \$800 package price is less than the two items would sell for individually, and the buyer gets to use the full potential of both items right away.



# PCommunicues

## From Boca to Berkeley

Berkeley, California is an unlikely habitat for an IBM veteran of 22 years, but Paul Chasen, recently of Boca Raton, has joined Information Unlimited Software as its new

vice president for research and development. Chasen, whose work at IBM goes back to the original 360 mainframe computer, was instrumental in IBM's acquisition and release

of vendor software for the PC. Like a retired naval officer at the helm of a tugboat, Chasen will help the independent software company ready its new products for the IBM, Apple, and other personal computers.



## Software Show-Biz

"Interactive system design is a branch of show business, specifically, moviemaking," says Ted Nelson. The iconoclastic author of *Computer Lib*, a seminal anticipation of personal computing published in the mid-1970s, expanded on this thought in a talk to the National Office Automation Conference. Nelson encouraged designers of office software to think in terms of major visualizations, sound effects, pace, and continuity. He argued that making a program work right takes only a quarter as much time as giving it "the right feel" and proposed that a new kind of professional, analogous to the movie director, be an influential participant in the design of future business computer programs. Nelson also suggested office software take some hints from arcade games such as *Pac Man*—having an "attract mode," for example, to get potential users acquainted with its features.

Frontiers of a discipline are often expanded when people from other disciplines move into it and introduce notions and techniques from their original fields. As the son of two Hollywood professionals, Nelson had an opportunity to absorb the craft of moviemaking. Having chosen computers as his own field, he may be in a good position to understand the value of translating over those show-biz techniques. "Cue the cursor. Lights, camera—compute."

## Plug-in Price Drop?

Before "PC" stood for "Personal Computer" in the IBM world it stood for "plug-compatible"—a phrase describing other manufacturers' equivalents that would plug in to replace elements of IBM systems. Thomas Hong is a veteran of that earlier p-c business. Now he forecasts that phenomena he saw in the original IBM-plug-compatible industry will happen again with companies that make p-c's for today's PCs.

Hong, president of Davong Systems, which makes PC memory add-ons and hard-disk storage systems says, "In the beginning, prices were high. A lot of companies went in without understanding what they were getting into. Then IBM cut prices on products the plug-compatible equipment was designed to replace. Prices dropped, profit margins eroded, and a lot of companies went out of business."

To avoid that scenario, Hong says his company will set low prices to begin with, which he says he can do because Davong is well financed and can order in volume to get discounts from suppliers. His not entirely disinterested advice to smaller companies that want to make PC plug-ins: "Stay away from the commodity markets like memory boards—stick with more specialized markets." Hong's advice to buyers: "Be prepared for prices to fall."



## Whither Modular Video?

Ever wondered how come the IBM PC's screen display circuitry is designed as a plug-in card rather than built right into the basic design? The ability to respond flexibly to marketplace developments seems like one good explanation. For example, note the elaborate display of the new Concept computer from Corvus Systems, Inc., which the company modestly describes as "the next generation in personal computers." You can flip the Concept's display 90 degrees from vertical to horizontal; when vertical it can display 72 lines of 90 characters; when horizontal, it will show 56 lines of 120 characters. It's the equivalent of about three PC graphics displays stacked together (720- by 560-point resolution). As with the PC's graphics adapter, text and pictures can be mixed. Corvus sells the basic unit for \$4,995.



Will this jazzy display make your PC obsolete? Not hardly. Courtesy of the modular display adapter, if Corvus's design proves a hit, then either IBM or other companies could produce a plug-in equivalent for the PC. All the rest of your system stays intact and the upgrade is as easy as pie—the memory space for such a dense display is already designed into your PC.

## "Firms in high technology are... creating a personal computer industry that will soon outsell the auto industry."

—George Gilder, writing in *The Wall Street Journal*, April 22, 1982

## No-Cigar Department

Previously in these pages we quoted someone's assertion that the PC is the only IBM product to use the Intel 8088 microprocessor. "What a mistake," wrote one reader. He told us we were "flagrantly incorrect" because the IBM Displaywriter word-processor also uses the 8088. To this individual we award neither \$50 nor a cigar; as we understand it, the Displaywriter uses the 8086 processor. Close, as they say, but...

This department will surrender its own stogie to the repo man on account of a bona fide erroneous report. We misstated (PC, February-March, 1982) the terms of the discount offered IBM employees buying PCs. According to a price sheet we've been sent, the average employee discount on hardware is about one-third off retail (such as \$1,517 for a 48K, 1-drive system unit listing at \$2,325). Software discounts run about 45 percent (such as \$91 for the \$175-list *EasyWriter* program). One system per immediate family member is allowed at these prices, with 12 percent, two-year financing through payroll deduction.

PCommuniques (February-March, 1982) reported that software authors who are IBM employees can sell their wares only through Big Blue.

An IBM employee who prefers to remain anonymous

suggests another way for fellow employees to sell their programs. Staffers can submit programs to Science Research



Associates (SRA) of Chicago, Illinois. SRA, an IBM subsidiary, is looking for educational software.

## Timely Sign

When IBM gave them its blessing, personal computers gained a new aura of legitimacy. But now they have been implicitly endorsed by an even more significant arbiter of public acceptance, *Time* magazine. With its May 3 issue, *Time* inaugurated a continuing section entitled "Computers." We assume it is the personalization of computers that is making them of regular interest to *Time* readers. For the sake of symmetry, PC briefly considered adding a section called "Time"—but that's always in short supply around here.

## IBM Announces Changes To Software Submission Plan

IBM has announced new terms and a submission procedure for programs. Effective immediately under the new plan, dollar royalty ceilings have been eliminated. Royalty terms—percentages, advances, and duration of payment—will be individually determined for each accepted program and documentation. Software submission is a new two-step procedure. A single-simplified agreement is signed before submitting a program to IBM. Thereafter, a separate software contract will be offered when a program is found acceptable by IBM.

Software submission packets, containing an explanation of the revised Software Submission Plan, copies of the new Software Submission Agreement, and guidelines to assist authors, will be available from IBM, External Submissions Department 765 PC, Armonk, NY 10504. Authors who currently have software under evaluation may choose, upon IBM finding it acceptable, between the previous and revised Software Contract.

## Xerox Monk

Stephen Kennedy, a soon-to-be-graduate of UC Berkeley, suggests a new term for the computer enthusiast. If a "grease monkey" is an accomplished mechanic, then what do we call those who work with computers? Stephen flashed on the famous Xerox monk, and, like a miracle, the term came to him—"CHIP-MONK."



# PCommuniques

*"Word processing is like a dishwasher; you put the words in and they come out cleaned up."*

—Theodor H. Nelson, speaking to a session at the Office Automation Conference, April 2, 1982

## A Visi-tor Speaks

Getting past the imitation-equals-flattery chestnut, how do the folks at VisiCorp feel about the many "VisiClones"—23 by one count—that their VisiCalc spreadsheet program has spawned? Rich Melmon, director of product marketing for the company, fielded that question among others during a recent visit to the PC offices. "VisiCalc is a two-year-old product," said Melmon. "It's easy for people to see what's needed to add to it. After selling more than 200,000 copies, it's easier still for us."

The imitators tend to look at the problem in too narrow a way," Melmon continued. "The spreadsheet market is different from what it was two years ago. You're dealing with more corporate rather than personal data; you're dealing with more numbers and with data that already exists somewhere in a corporation's computers. The next generation of spreadsheet software must address these issues." The next generation? Melmon wouldn't elaborate but suggested more might be forthcoming at the National Computer Conference in June.

## We ASCII-d, He Answered

Whoever told your communications editor (PCommuniques, April-May, 1982) that the IBM PC somehow used EBCDIC code internally for better communication with big mainframes was pulling his leg. The PC doesn't have an EBCDIC bone in its body.

EBCDIC (pronounced ebb-suh-dick) is the standard interchange code for most IBM machines, probably because it

is a binary representation of a punched card code. However, the fact that the PC uses the Intel 8088 microprocessor instead of an IBM-developed CPU makes it a strictly ASCII machine.

As far as communication with big IBM mainframes is concerned, most of the big machines can speak ASCII to the outside world out of necessity to communicate with a variety of non-IBM terminals over the telephone. The IBM System/34, for example, supports both ASCII and EBCDIC in its communications software. Even if the big machine couldn't speak ASCII, it would be a simple matter to write a program for the PC that would do the conversion.

—Burks A. Smith

## Big Name Dictionaries

Here's a computer-age version of an old philosophical quandary: Who checks the spelling of your spelling-checker program?

The newest answer is: The

editors of big-name dictionaries. Yes indeed. No longer need you settle for an off-brand lexicon to comb your text for goofs. New York entrepreneur Dick Brass has gone around and sewn up the microcomputer rights to several well-respected reference works that he is now relicensing to publishers of proofreading programs and the like. Brass says PC users will soon be able to check their text against word lists from *The Random House Dictionary*, *Black's Law Dictionary*, and *Stedman's Medical Dictionary* for starters. Peachtree Software will be the first to base products on word lists from Brass's company, Dictronics Publishing, Inc., but he says other firms will follow.

Brass is also promoting new products built on familiar reference books. In April he and Peachtree demonstrated a program built on the *Random House Thesaurus*, for use in conjunction with word-processing. When you seek a synonym, Brass says the Peachtree program will produce an on-screen list of

possibilities from the 80,000-word *Thesaurus* in no more than three seconds. Brass said the program would definitely be available for the IBM PC this year, but he wouldn't say exactly when.

## Disk Conservatism

"PC" might stand for "pretty cautious" in design, at least in the case of the PC's disk storage system. Anyhow that's the impression one gets from Stuart Lynne of Network Consulting, Inc. up in Vancouver. Lynne's company has been developing a version of the UCSD p-System operating system for the PC, and in the process it has been able to squeeze extra speed and 25 percent more storage out of the PC's disk drives.

As an example of IBM's caution in design, Lynne cites the gap size used between sectors of data on the disk. IBM leaves gaps equal to 80 characters of data, but Lynne says a 36-character gap is adequate. By making this change, NCI shoehorns ten data sectors onto each disk track, where IBM settles for eight. To speed up disk access, Lynne's software waits only half the time—four milliseconds vs. eight—that IBM allows for the disk head to settle in position before reading or writing.

If IBM's design is as cautious as Lynne points it in disk storage and other aspects, the conservatism is understandable. In designing a product for people unfamiliar with computer quirks, wouldn't you want to err on the safe side in the reliability department while leaving it to others to test where the real limits are?

## PCommuniques Pays

Are you in possession of information you think should appear in PCommuniques? PC pays \$50 for each contribution published in this section. Submissions must be signed, but anonymity will be preserved upon request. All submissions become the property of PC and are subject to editing. For payment, you must include an address and phone number. Write to PCommuniques, 1528 Irving St., San Francisco, CA 94122.



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## An Indepth PC-Exclusive Interview with Software Pioneer Gary Kildall

# CP/M's Creator

For a few years in its early adolescence, the microcomputer industry had its own version of Hollywood's Oscar, presented by an awards committee of one, microcomputer publisher (now manufacturer) Adam Osborne, in recognition of each year's most significant contribution to the advancement of the new industry. Recipients of the award included such personal computer luminaries as Apple Computer Corporation's Chairman Mike Markkula (1979) and VisiCalc program authors Dan Bricklin and Bob Frankston (1980). But the very first person to get the award (1978) was a bearded, young software author working out of a Victorian house in the seaside village of Pacific Grove, California.

Paraphrasing the citation that accompanied the award, presenter Osborne told a packed banquet hall, "We had a lot of silly little boxes being sold to enthusiasts and doing nothing. Gary Kildall came along and gave us CP/M, an operating system that allowed those silly little boxes to start doing something useful."

Four years later, with IBM and other major companies vying for a share of the market, the little boxes no longer seem silly at all. And Gary Kildall no longer works in a Victorian house. Digital Research, Inc., the company he founded, now spills out of a sizable new office complex overlooking Monterey Bay. CP/M,

an acronym for Control Program for Microcomputers, is now offered not only for computers with curious and unfamiliar names, but is available in demand for machines bearing the nameplates Wang, Digital Equipment Corporation, and other computer-industry-heavy hitters. Its influence has spread even further. Kildall describes IBM's own PC-DOS, together with operating systems sold by several other companies, as "a CP/M derivative." Now, in what must be interpreted as another award of sorts, there is a version of CP/M officially issued under the IBM name and logo, though the disk's copyright notice credits Digital Research.

The original credit, of course, belongs to Kildall himself, who devised the first CP/M version as an entrepreneurial venture after the semiconductor maker he worked for (Intel, maker of the 8080 and now 8088 processors) told him that his CP/M precursor had no commercial possibilities and that they were not interested







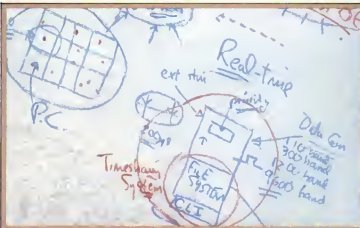
in it. Now Digital Research offers several advanced descendants of CP/M, as well as computer languages such as CBASIC and a variety of related "systems software" products. Intriguing new products are hinted at for imminent announcement. Kildall has not retired to his laurels behind an expansive desk in some paneled office, however. He is still a man doing the work he loves—harnessing the intricate inner workings of computers. Moments after the end of the interview that follows we spotted him back in his open-office cubicle, surrounded by three computer screens, intent at the keyboard of one of them.

One spring afternoon Gary Kildall took a break from his terminals to share with PC some tales and insights about CP/M-86 as it is now offered for the IBM Personal Computer, and to gaze a little into the future. His enthusiasm frequently burst through his laid-back demeanor, erupting into a profusion of colored diagrams on the blackboard behind him.

**PC:** Tell us about CP/M-86 and how it compares with PC-DOS.

**Kildall:** Basically, you know the history of PC-DOS—where it came from, and so forth. It's one of the variety of operating systems we call CP/M lookalikes. It arrived on the scene between CP/M version 1.4 and CP/M 2.2, so it has characteristics of CP/M 1.4 and extensions toward the CP/M 2.2-style file system, but with differences because they were kind of simultaneous in design. There are subtle differences but PC-DOS is fundamentally the same as the 8-bit version of CP/M as far as the user is concerned, and also as far as the program interface. Most of the interface differences between PC-DOS and CP/M are misunderstandings of the CP/M calls by the person who wrote the original PC-DOS implementation, simple things like returning FF rather than 1, things that are of no consequence but just weren't done specifically the same.

CP/M-86 has been out for about 14 to 15 months. It was designed around CP/M-2. It's exactly the same as CP/M-2 in terms of the function calls, the way the interface appears to the user, and the way the program interface appears to the programmer. The difference is in the extensions you find in the 8086 processor. Number one is memory management; the major extension is being able to partition



## An Uninitiate's Glossary

The patois of the master programmer rolls flowingly from Gary Kildall's tongue. Readers familiar with computer intricacies down at the "bits-n-bytes" level will

follow right along. However, we think all who are interested in PCs can benefit from Kildall's insights. To assist uninitiates we offer this glossary.

**Returning FF**—A function within the operating system reporting the result of its operation to another part of the program by sending the number "FF," which is 255 (the largest a single-memory cell can hold) written in the base-16 shorthand programmers often use.

**Development**—Program writing.

**Symbol table**—One product that prepares a program using assembly language.

**Persistence**—In video displays, the tendency of an afterimage to remain after the screen has been erased.

**Backplane**—A section of the system unit into which additional circuit cards can be plugged.

**Z-8000, M68K**—Microprocessors competitive with Intel's 8086.

**Source program**—A program in assembly language, which gets translated to an "object program" of numeric instructions the processor understands.

**Add immediate 5**—A program instruction in 8086 assembly language, ordering that 5 be added to the current number the processor is working on.

**Operation codes**—Numeric instructions—one for each of the basic operations (such as "add" or "compare") provided in a particular processor's design.

**Registers**—The working spaces of a processor chip. Different chips have different assortments of registers with different names.

**Flags**—Special registers that record particular details of a number, such as whether it is zero or not.

**Shifts and rotates**—Types of arithmetic operations used on binary numbers.

**Data bus**—The channel via which components of a computer system exchange information.

**Algorithms**—Formulas for calculation.

**Megahertz**—For a microprocessor, how many millions of times per second its internal clock ticks, permitting another step in one of its basic operations.

**Bank switching**—Exceeding the maximum number of memory cells a processor is designed to use by switching its connection among more than one bank of memory.



out and allocate memory, to load multiple programs, for example.

PC: That's a difference between CP/M-86 and the 8080 version of CP/M. How about other differences between CP/M-86 and PC-DOS?

Kildall: CP/M is really a complete development environment; with it you get an editor, an Intel-compatible assembler, and a debugging system—DDT—that has built-in disassembly in the debugger itself. So you can just pick up CP/M-86 and start developing your own high-performance applications. From the beginning, CP/M has always had that flavor to it. It's a base-level operating system that is a complete development system in its own right and doesn't need anything else to support it, though people have gone off and added to it. It's like the IBM PC in that way—an open system. The basic system, when you get it and turn it on, still works to perform basic functions. But some people will go toward BASIC interpreter and others toward Pascal or PL/1.

PC: A lot of people are going to be buying the PC who are not software developers and are not likely to become software developers. Will you or IBM offer a user or "run time" version of CP/M-86 for people who don't need the assembler, the debugger, and so forth?

Kildall: I don't know. There aren't any plans for doing that at this point. It's traditional for CP/M to have those tools available and we don't want to change that

out there and see what customer reaction is. We'll go from there and work some things out with IBM.

PC: How do you feel about describing the PC, with its 8088 processor, as a 16-bit machine? After all, you call the operating system CP/M-86.

Kildall: I see a 16-bit machine as one that has more memory. I don't think of it as anything more than that. Hence the PC qualifies as a 16-bit machine. It satisfies all my needs because I've never been concerned about the speed of an 8-bit processor; they've always been fast enough to do the tasks I want. The only thing I've been concerned about is running out of symbol table space, or just trying to stuff a lot of functionality into a small spot. The 16-bit machine relieves that pressure. You've got it with the PC.

PC: What's your evolution of the PC in general? What do you see as its strong and weak points?

Kildall: I think the product itself looks really good. They've done an excellent job of IBM-style presentation. It looks good, works nicely, and the display is reasonably good though it has a little bit too much persistence for me. One problem is it needs more backplane; you can't stuff as many boards in as you'd like. And 5¼-inch disks are just not enough. This industry already knows that we've evolved past those things. You're talking about a 256K memory system with 160K single-sided drives, and that doesn't make a whole lot of sense. The 5¼-inch hard disk add-on is going to occur with any serious usage of the system. Other than that I don't think there's anything particularly wrong.

In terms of the marketing, they've taken a very professional approach to set standards toward which the rest of the industry can work. I think we've learned things about the presentation of our materials that we'll use in the rest of our product line. I'm sure the companies that maintain the level of presentation that IBM has provided will be successful with their software products, and those that don't—that still have a kind of shabby appearance—will probably be out of business within the next few years.

PC: When was the first time you or somebody at Digital Research knew about IBM's PC project, and what were your thoughts when you learned about it?

Kildall: I can't recall exactly when we

found out about it. It's probably been over a year. I get a little reluctant to talk about it, because I don't know that they're not going to come back and ask, "Why did you say that?" IBM is very careful about what you put out. But we've known about it since fairly early in the project.

## **P**<sub>C-DOS</sub> *is one of a variety of operating systems we call CP/M lookalikes.*

About my response to it: I was really happy. We've put a lot of effort into 8086 stuff for the last couple of years—made a big investment moving our software in that direction. I was really concerned, probably about the time IBM was first talking about using the 86, that the 86 was not going to make it. Everybody was talking about the Z8000, and the M68K was on the horizon, and I thought, "We're going to have some real troubles here if the 86 doesn't make it. We're going to have a really hard time, because we'll have to go back to old CP/M-80 and hope it supports the development of our next generation of software after this four pos." IBM basically decided the 86 was going to make it, that we've got a substantial market there to sell to.

PC: You said CP/M-86 has been out for 15 months. What application software has become available for it, and will that software be immediately usable on the IBM PC?

Kildall: There's quite a bit of stuff out that's translated from the 8-bit world. There's a considerable amount of CBASIC (commercial BASIC) software that can come over immediately. The amount that's going to be available will be evolutionary.

We've contacted a lot of the software vendors we work with. We've told them we're getting into this and are interested in supporting their downloading and production efforts. We've got maybe 15 or 20 of these that IBM has allowed us to use as test sites; they are doing word-processing systems, general ledger, accounts receivable, and spreadsheets.

One way we're motivating software translation is with our IBM Displaywriter

**T**  
*HE THING  
we're trying to do  
with CP/M-86 is to  
make it as much  
like the 8-bit world  
as we can.*

structure right now. We'd be having all sorts of difficulties with the pricing differences. The basic thing we're trying to do with our initial release of CP/M-86 is to make it as much like the 8-bit world as we can. We feel there are a number of reasons it was successful and that the same thing will be true for 16-bit. We just have to get it



# Killdall on ...

**CP/M-86's DOCUMENTATION:** We're the only supplier to IBM that has done the whole thing—from creating the document, typesetting and printing it, to delivering it in packaged form. This was something we wanted to do to get the experience—everything down to the little picas.

**FUTURE IBM DEVELOPMENTS:** We're trying to get our OS to match their releases of hardware and so forth. It's really impossible for me to say anything specifically about more disk space, or facilities in data communication, or whatever, because we're really under their confidentiality agreements on those things and we value that very highly. But I can say we're in step with all the things that will be available on the PC. We're in a very open relationship with IBM. They want our system to be successful on their computer. As a result, they let us know in a timely fashion to be sure that our system supports their features.

**IBM SOFTWARE PUBLISHING:** I don't think they understand the problem of getting new, independently authored software into production in a useful way. I think they're using a simplistic approach that will probably change when they get some experience. The approach of taking software from employees and giving them a cap of \$100,000 on royalties is one that we know from experience won't work.

**PC SOFTWARE DISTRIBUTION:** I think there is going to be difficulty in trying to stuff a large amount of software through a small funnel. Timing is really critical; the reaction time isn't fast enough. Nine months to a year to react isn't fast enough. Alternate marketing channels will develop for software. The most selected or preferred software will end up being in computer stores and on IBM shelves, but not the most innovative software; I think you'll find that elsewhere.

version of CP/M-86. We're really doing promotion, saying to software vendors, "We're selling bunches of this stuff. It's a very popular system and we don't have any competition." Once they get things running on the Displaywriter, they can go over to the PC immediately.

We also have a program at test sites called "send-receive." It will go out at reasonable cost to vendors who are interested. "Send" runs on 8080 systems and "receive" runs on the PC or any 8086 system, and there is an RS-232 connection we make according to our specification. The program has a little interface to the user that asks what kind of programs you want to send, where they're coming from, where they go to over here, and then there's automatic retransmission going back and forth. This makes it easy to get 8-bit stuff over to the PC. But it's going to be an evolutionary thing. Available right away on the PC, I'd say, are probably six or seven popular software packages.

**PC: What are some of the complexities involved in translating a program from 8080 to 8086 form?**

**Kildall:** Straight translations at the source program level you can do pretty much mechanically. For example, an 8080 "Add im-

mediate 5" instruction turns into an "Add AL 5" on the 8086—a very straightforward translation of the op codes themselves. The complexity in mechanical translation comes from situations such as this: The 8080 instruction DAD H takes the HL register and adds DE to it. For the 8086 the equivalent instruction would be something like ADD DX BX, which is fine, no particular problem. You just say the DX register is the same as HL and BX the same as DE. The problem is that the 8086 instruction has a side effect of setting the zero flag, and the 8080 instruction does not. In mechanical translation you end up doing something like saving the flags, restoring the flags, doing some shifts and rotates, and so forth. These add about five or six extra instructions to get the same semantic effect. There are a lot of sequences in 8080 code that produce very strange sequences in 8086 code; they just don't map very well because of flag registers and things of that sort. The way we get software over is a thing called XLT-86. It's been out six months or so.

**PC: By "better" code do you mean smaller?**

**Kildall:** Twenty percent smaller than if you just took every op code and did a

straight translation, saving the registers to preserve semantics.

**PC: How does the size of the translated program compare to the 8080 version?**

**Kildall:** If you take an 8080 program, move it over to 86 land and do an XLT-86 translation, you'll find that it is roughly 10 to 20 percent larger. With 16-bit machines it's more difficult to address everything; you get op codes that are a little bit bigger on the average. An interesting phenomenon is that one of the reasons you don't get a tremendous speed increase in the 16-bit world is because you're running more op codes over the data bus.

**PC: Is CBASIC also going to be available for the PC?**

**Kildall:** CBASIC and also Pascal MT+. These are both running on the PC right now. They'll be offered simultaneously. Then CIS Cobol. PL/1-86 is a more difficult thing. We've worked on that since last July and it looks like it's pretty close now. We have a lot of future in that one, especially on the IBM PC. We've seen a lot of interest from people who are getting into the PC through IBM channels—PL/1 users; the biggest community of PL/1 users is IBM itself. But the biggest software vendor

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languages are CBASIC, number one, and Pascal, number two. These are going to be the basic tools.

**PC: Will you introduce any enhancements for CBASIC?**

**Kildall:** Color graphics. We've got an in-house color graphics subroutine about ready that will be made available through our languages. It does direct, display memory operations for high-speed rectangular painting, building objects and circles, things of that sort.

**PC: Are your CBASIC color graphics similar to those in Microsoft's Advanced**



## BASIC for the PC?

Kildall: They're similar—the same kind of stuff. But we're not necessarily looking for exact compatibility because the CBASIC community is different from the MBASIC. We had the orientation toward color graphics some time ago, and whether there was IBM or not, it was an important part of our future.

PC: Microsoft's BASIC is very specific to the hardware features of the PC, such as the function keys. Will CBASIC be modified in similar ways?

Kildall: I don't now how product specific it's going to be. Other manufacturers, the Japanese for example, have specific requirements too. Our intent is to be as general as we can with the facilities or functions that we add to CBASIC. As this market grows, there's no doubt we're going to have more machine-specific things coming into the language if the customer demand is great enough. Right now the implementation for the IBM PC will handle all the function keys and that sort of thing. That's no problem because that's built into the internals of our operating

system. For the display, in terms of handling screen management, it comes in a package we're going to be releasing called DM, a display manager. This product has been in the works for probably close to a year; it's definitely in the final stage, but we haven't announced anything. The display manager is something you can link with CBASIC or Pascal or PL/1 or whatever, and it will handle all the stuff you like to do in terms of getting a fully interactive screen.

One of the things I think is significant about what we're doing is taking functions like the display manager system and really standardizing it as part of the operating system. There's also a thing called AM-86, an access method for high-level data-file interfacing.

PC: On other microcomputers it is possible to run Microsoft BASIC under CP/M. Will it be possible to do so on the PC?

Kildall: Doing something like that is fairly trivial. The differences are relatively easy to take care of through a simple interface. Whether we'll do something like that, whether that would run MBASIC, we

don't really know at this point. We would need some specific clients to do that. The intention is not to.

PC: What about the possibility of software emulators that would allow programs for PC-DOS to run under CP/M-86 or vice versa?

Kildall: I'm not really hot for emulators of other systems, basically because then you've got to track someone else's development cycle; they come up with a new release and you've got to scramble. There's been an emulator announced for CP/M-86 that supposedly runs under PC-DOS. I haven't seen the emulator, but I understand the differences between the two systems, and I would be extremely surprised if that emulator in fact emulated CP/M-86. Emulators can get you in a lot of trouble.

PC: What do you think is important in the design of an operating system?

Kildall: When you're designing operating systems or talking about software in general, the successful software seems to be that which fits the resource you're working

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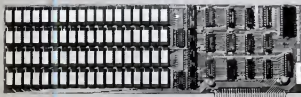
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software will not be successful because it's going to run ineffectively, and if you don't use all the facilities, someone will come in and use them. During the last decade we've seen the evolution from 256-byte read-only memory, which was the first "operating system" that ran the Intel 4004, up to what we're looking at now in terms of real time systems and networking, data base management, and all sorts of things that are really embedded in the OS itself.

Software design for the 8-bit machine takes limited resource into account. You have a small operating system, typically single-user, a single-stream operating system, and it's not going to have any overlays. The reason you don't have overlays is you are typically using a floppy disk and they're just not fast enough to do overlays. The result is the OS is small, the application code is large, and that's why CP/M itself can't get much larger, because the typical application for an 8-bit machine uses almost all that memory, and that's the real constraint. To go to something like concurrent systems—concurrency is doing background and foreground—you have to do it with bank switching, and that's all nonstandard.

The software design for a 16-bit machine takes additional resources into account. We're talking about 128K of main storage in a minimal system, and often a hard disk. What you want to do is add functionality to the OS—the kind of things people are really going to need: concurrency, multi-access file systems, network communications, and shared code. Our strategy is moving people from the 8-bit world to the 16-bit world: The first step is



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to take 8-bit CP/M and move them over into 86 CP/M, and add memory management for the megabyte machine and multiple-resident programs. Fundamentally, this is the only difference in the system, so anyone who understands 8-bit CP/M can go into 16-bit CP/M and see the same things.

PC: Where does this strategy lead for the future?

Kildall: Single-user concurrent is the mode of operation we feel is going to be the most important way for the PC and other 16-bit machines to be used. That means you have a terminal attached to your PC and work with multi-ground operations. You might have the word processor in the foreground at a particular time. Behind that you have background applications. They're hidden, but could be brought back up to your active console. Maybe there's a payroll program printing checks on your printer at the same time you are doing your word-processing, and maybe a compile going, a network interface, and possibly some programming down the line.

You have to learn how to use this effectively. When I'm going to develop one of my programs, I can be in the editor, switch over to being in the middle of my debugging so I can find more things that are wrong with my program, go back into the

and make all those changes. With concurrency you get that immediate response, go right back into the editor, make the changes, do some more debugging. The result is you get all the fixes in by the time you finish the debugging session.

We're trying to bring the mini- and mainframe software vendors into the 16-bit software world through concurrency.

PC: Besides concurrency, what other changes do you see coming?

Kildall: Since we don't have the same limitations on the size of memory, we're going to get a lot more competition in terms of comprehensive, say, spreadsheet-type applications. We've got this functionality; there's no effective limit on what we can add to that functionality. So the old applications we've seen are going to be vastly improved. Each product is going to be significantly better and probably at close to the same price.

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editor and make the changes immediately, then switch back to test some more. What I used to do was go into the debugger, make some changes, maybe make some hand patches, take some handwritten notes, run a little further, then go back into the editor

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# CP/M Arrives

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It is a little ironic that the IBM Personal Computer version of the CP/M-86 operating system seems in several ways better fitted to the PC than does IBM's first-introduced and seemingly favored alternative, the IBM Personal Computer Disk Operating System (PC-DOS). However, the better fit is mitigated by CP/M-86's six-times-greater price tag, and is possibly explained by CP/M-86's debut six months further along the "learning curve" than the introduction of PC-DOS.

CP/M-86, introduced on April 5 and priced at \$240, includes a single, 5¼-inch disk and a manual in one of the now familiar slipcases. The disk contains 13 programs, or "command files," including versions of Digital Research's assembler and debugger programs for the PC's Intel 8088 processor. The disk is not copy protected. The user's manual consists of 372 pages organized into 11 chapters, a preface, 6 appendices, and an index.

In a feature-for-feature comparison, IBM's version of CP/M-86 is strong where PC-DOS is weak, but the reverse is also true. One irony in a comparison is that the function keys—the use of which IBM is said to have urged vigorously upon outside software developers—are used more meaningfully by CP/M-86 (hereafter, simply "CP/M") than PC-DOS. (Yet both operating systems require that users memorize the meanings of the keys; neither provides the on-screen legends offered by the PC's BASIC language.) The keys are used by PC-DOS to edit lines of input to the operating system. CP/M uses the keys for single-keystroke execution of such oft-used functions as viewing a disk directory or checking the available space on a disk.

Other areas in which CP/M seems stronger than PC-DOS are in offering programs easier access to the PC's display and keyboard features, and in easing serial-



type communications. IBM's BASIC language companion to PC-DOS contains many commands for controlling display features, such as cursor position, character color or other attributes, text or graphic screen mode, and the like; but PC-DOS itself is devoid of mechanisms for dealing with such matters. Using CP/M, you can control all the display adjustments and similar items by sending the operating system sequences of two or more characters started with the "escape" character.

## Easier Use of Serial Port

PC-DOS's BASIC also provides comprehensive facilities for adjusting operation of the asynchronous serial commu-

nications ports, while PC-DOS itself has no equivalent controls. That's inconvenient if you want to use the COPY command to print a file on a serial printer that communicates at some speed other than the built-in setting PC-DOS uses automatically. CP/M provides two commands, PROTOCOL and SPEED, that deal with most imaginable requirements for setting up serial communications. The PROTOCOL command allows selection of either widely used convention by which an attached device can tell your computer when it is, or is not, ready to accept data (the XON/XOFF and ETX/ACK protocols); there's also a third choice for when no protocol is required. The SPEED command lets you



set all the remaining adjustments you might need to cope with in order to establish successful serial communication: transmission rate, number of "stop bits," and the like. By incorporating these features into the operating system, CP/M makes it unnecessary for individual programs to recreate them, and simplifies using CP/M commands, such as TYPE, directly with serial devices.

Contrariwise, PC-DOS has a MODE command that allows direct adjustment of linespacing and character size on the IBM matrix printer and permits tinkering with display positioning to compensate for a maladjusted video monitor. CP/M lacks both these features.

#### Tells What it's Doing

Surprisingly, in view of the ultra-terse screen interaction style of earlier CP/M versions, CP/M-86 is very communicative in several respects about what it is doing. When you start it up (either by switching on the computer or pressing CTRL-ALT-DEL, just as with PC-DOS), it counts off, "READING 1 . . . 2 . . . 3 . . . 4" as it loads

the four disk sections of its main program into memory. It then displays a list of the hardware it detects as installed and working in your PC. When you give the command to format a disk (in CP/M it's called NEWDISK), the first result is a screen message repeating back to you which disk drive you've ordered to perform the formatting procedure. The message warns you, "ALL DATA WILL BE ERASED FROM THE DISK" and asks, "Is this what

## **I** **N VIEW** *of the ultra-terse style of earlier CP/M versions, CP/M-86 is very communicative.*

you want [y/n]?" If you say yes, CP/M then displays a running progress report as data tracks are written and verified.

There are other areas in which PC-DOS is a better communicator. When a problem has occurred in using a disk, PC-DOS gives you the choice, "Abort, Retry, Ignore?" while CP/M presents the laconic choice, "A, I, C, R?" (and it's still not clear what "C" does!). CP/M's facilities for copying and moving files, collectively known as PIP for Peripheral Interface Program, carries forth the same inscrutable command syntax seen in earlier CP/M versions. Thus CP/M gains a point for consistency, but PC-DOS gains an offsetting one for understandability.

A key feature of PC-DOS that CP/M apparently does not provide is an option to set up a disk so a certain program or series of them goes to work automatically after you turn on or reset the computer. Apparently, it is possible for software experts to add an "autoexecute" feature to CP/M, but such a feature is not standard. Also, PC-DOS provides explicit methods for programmers to create their own variation on the "command processor" program that interprets how to handle your commands to the operating system. This kind of vari-

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ation may be possible with CP/M, but ways to achieve it are not explicitly given in the manual. One way variant command processors are used is by programs that redefine key meanings on the keyboard, or lock out such key functions as break and reset—a frequent strategy to frustrate software copying.

#### Disk Capacities About Even

Disk storage capacity for the two systems is comparable. A formatted CP/M disk has 141K of free space after the operating system has been copied to it. CP/M will have an edge in the future, however, since it includes the ability to use two-sided disk drives, which IBM is expected to have announced by the time this is published. PC-DOS is a little more detailed than CP/M in its reports of disk contents; it shows a file's size to the exact number of characters, where CP/M shows an approximate size rounded up to the next larger "K." But CP/M offers extra features in assigning "attributes" to files and allocating files among up to 16 separate "users."

When CP/M is in control of the computer, it uses the bottom line of the screen for a "status" display, which includes the

## A FORMATTED CP/M disk has 141K of free space after the operating system has been copied to it.

current time and date. Those who do not enjoy seeing their life tick away in front of them, second by second, will find this feature questionable. CP/M does not demand you type in "today's date" as does PC-DOS. Instead, it goes on using the last time and date it was aware of until you set it otherwise. When first loaded out of the box, the disk displays the date 2/10/82, perhaps suggesting when the last tinkering with the product was finished.

The user's manual is very much in keeping with those accompanying other software IBM sells for the PC. It is well and clearly, but not frivolously, written. The organization is simple and quickly understandable. The novice will not feel unduly put off, nor the expert patronized.

#### Considering the Choice

Comparing functionality and ease-of-use, the choice between these two operating systems would appear to be in the "six-of-one, half-dozen-of-the-other" category. Each excels in spots and falls down in others. From the programmer's point of view, a choice has yet to emerge. The key "function calls" by which programs employ the operating system are virtually identical between the two. CP/M-86 sells for six times the price of PC-DOS, but includes tools for assembly-language programming that PC-DOS does not provide. The assembler is considered by many to be an essential tool for advanced programming.

For those who don't plan to do assembly-language programming, CP/M seems a less compelling purchase. Ultimately, it

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will depend on the appeal of other software that is marketed to run using one program or the other, or perhaps a different system will come along and overshadow both. An obvious gap in the CP/M offering is a minimal version meant only to support the use of other programs, a so-called "run-time package" priced comparably with PC-DOS. Availability of a run-time package would make it easier for software marketers to choose CP/M without imposing a \$200 price disadvantage on their programs.

The introduction of some compellingly desirable program offered to work only

with CP/M-86 might shift the momentum in its favor. Regarding conversion of existing programs from earlier CP/M versions, all parties generally concede that the conversion effort is about equal to get to CP/M-86 or PC-DOS.

The real value of CP/M-86 may be in illustrating what even a short move along the relatively horizontal part of the learning curve can produce. CP/M may be winning wide acclaim and adoption as "almost an industry standard," but its version for the IBM PC tends to suggest there are plenty better things to come.

—Jim Edlin

## Still Another CP/M Choice

*CompuView Products introduces its own CP/M-86 version and says it's "better than IBM's."*

A Michigan software company has not only begun selling the CP/M-86 operating system for the PC ahead of IBM's own version of the software, they claim to have improved upon it as well.

CompuView Products, Inc., says that VEDIT, its \$325 implementation of CP/M-86, includes an increase in the IBM Personal Computer's standard 5¼-inch disk capacity to 196K characters, plus a way to define the use of the function keys. For \$100 extra, the user also gets horizontal scrolling and a full-screen text editor.

According to systems programmer/analyst Rick Fortson, CompuView's CP/M-86 uses "more of the available disk space," giving the user 193K of the 196K disk capacity. It also reads from and writes to only 5¼-inch, "double-density" disk format, not only those created on the IBM PC.

CompuView's CP/M-86 will work with all the IBM hardware, Fortson says, including the hard disks, which are not yet available, "because it's easy for our BIOS (basic input-output system) to handle them. We even handle expansion memory better than PC-DOS does."

Fortson says that CompuView's CP/M-86 is also more versatile than IBM's PC-DOS because it contains a terminal-emulation package. "Say you bought an application program that's written for CP/M-86, but it didn't specifically have the PC listed in its configuration utility. With our CP/M-86 you could emulate one of the terminals that it did list, such as the Televideo or Beehive or Hazeltine, and so on. The software for doing that is already in

our BIOS."

The reason for that, says Fortson, is that CompuView has, for two years, sold a powerful text editor, VEDIT (pronounced 'veddit'), a CP/M product used mainly by programmers to edit programs. Because VEDIT had to be configured for many different terminals, he says, "we already had the tables of CRT characteristics, the escape-sequences, and so on."

**F**RANKLY,  
we've got IBM beat,  
feature for feature.

VEDIT is now offered for the PC as well, he said, in both a CP/M-86 and a DOS version, for \$195. "The customer can also purchase our update subscription service: \$45 for two updates. Since VEDIT came out, we've offered an update every four to eight months; we believe in 'instantaneous' customer support. I should know. I'm the guy that patches software for your particular machine if you call in saying it doesn't work right."

"Software without headaches" is CompuView's design philosophy, says Fortson. "Even for an inexpensive screen editor [VEDIT] people get more support than they're used to. With the CP/M-86, frankly, we've got IBM beat, feature for feature."

—Hal Glatzer





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# BABY BLUE

Baby Blue, XEDEx Corporation, 1345 Avenue of the Americas, New York, NY 10105 (212/489-0444). \$600 for the board, software, and manual; \$980 includes WordStor and MailMerge.

Baby Blue from XEDEx Corporation is intended for PC users who want to have their cake and eat it too. It is an alternative

for those who choose the PC in anticipation of a new generation of powerful programs, but whose immediate needs seem better met by existing programs designed for other computers. Baby Blue could also serve people who already have a substantial investment in programs or data files not easily transferable to the PC.

XEDEx's \$600 Baby is a plug-in board and set of programs that, according to the manufacturer, allow an IBM PC to run the vast library of software that was written for the CP/M-80 operating system. CP/M-80 is the older brother of CP/M-86, which is now available for the IBM PC. The closest thing to an industry standard, CP/M-80 can play host to an estimated 2,000 ready-to-run programs. MicroPro International's WordStor word-processing system is one example of a CP/M-80 program that is in high demand by PC users.

Because the IBM PC uses an Intel 8088 processor instead of the earlier 8080 and Z-80 chips for which the original CP/M was designed, most software written for the CP/M-80 systems cannot run under either CP/M-86 or PC-DOS disk operating systems without some rewriting. Baby Blue creates compatibility by providing a Z-80 based "computer within a computer" while the PC itself remains under the control of its own 8088 processor. As a bonus feature, Baby Blue contains an additional 64K (65,535 characters) of memory. When in use, Baby Blue uses its own memory chips. When the PC is working under its own operating systems, Baby Blue functions as a 64K expansion board, upgrading a 64K PC to a 128K system.

Aside from the different operating system, another potential source of incompatibility is that most CP/M-80 software is written for computers that use an external

terminal, whereas display and keyboard functions are built into the PC. To overcome this, Baby Blue causes the PC to act like a Televideo 950 terminal. XEDEx selected the Televideo because, of all the popular terminals, it has screen and keyboard characteristics most similar to those of the PC, yet it is also compatible with the terminal supported by most CP/M programs, Lear-Siegler's ADM-3.

As I explain later, a CP/M-80 program or data file can be entered into a Baby Blue equipped PC in one of four possible ways. Once the program is in your computer, Baby Blue adds to it an additional 4K of code and then writes it to the disk as a PC-DOS file. The 4K consists of commands that inform the PC that it is about to run a CP/M-80 program and to turn on Baby Blue. All this is invisible to the user. Once that code is attached, you use it like any other program or file on your directory. A secondary advantage of using Baby Blue with existing CP/M-80 software is that XEDEx, by using some of the PC's memory and other facilities, has added up to 7K of additional working memory to the maximum available using most Z-80 or 8080 based computers.

Baby Blue is the first product of the New York based XEDEx Corporation. But





XEDEX President Harris Landgarten is no stranger to CP/M. He, along with several other XEDEX executives, left Lifeboat Associates, a major marketer of CP/M compatible software, to form this new venture.

A precedent for the IBM/Baby Blue combination comes from the Apple II microcomputer, whose processor, like the PC's, is not capable of running CP/M-80. To get around this, Microsoft Corporation offers Apple owners the "SoftCard." The SoftCard product, like Baby Blue, contains a Z-80 processor and gives the Apple user the choice of running the Apple under its regular operating system (Apple DOS) or the transformed Z-80 Apple under CP/M. Unfortunately, the SoftCard equipped Apple uses two incompatible operating systems, so software that runs under one system cannot access data created by the other.

## **I** **IF BABY** **Blue is to open up the** **treasure chest of CP/** **M software, the user** **must find a way to** **read the disks.**

To avoid that disadvantage, Baby Blue writes its files using IBM's PC-DOS operating system. The CP/M-80 data and program files can co-exist with PC-DOS files on the same disks, and data files created with CP/M-80 software can later be read by other programs that use PC-DOS. Vendors are gradually developing programs to take full advantage of the PC's 256K mem-

ory capacity. With any luck, many of these programs will be able to access files created by the Z-80 programs running under Baby Blue.

A cautionary note: As of this writing, PC-DOS files cannot be accessed by programs that run under CP/M-86. Since data created by Baby Blue controlled programs is written in PC-DOS, it is not presently compatible with CP/M-86 software. However, with computers everything is subject to change—usually for the better. It wouldn't surprise me if someone has already written a program to solve this problem.

### **How to Obtain Baby Blue Software**

If Baby Blue is to open up the treasure chest of CP/M software, the user must find a way for the PC to read the disks that the software comes on. XEDEX President Landgarten outlined four methods to obtain software that will run on the Baby Blue equipped IBM PC.

The easiest is to buy programs distributed in the Baby Blue format. XEDEX sells its own release of MicroPro's WordStar and MolMerge and is currently negotiating with other software publishers to provide Baby Blue formatted versions. The format problem is not unique to Baby Blue. There are several CP/M disk formats and all manufacturers of new Z-80 equipment face the same task of either adapting other companies' CP/M software or convincing the publishers to release a special version to run on their new machine. XEDEX is following the lead of Osborne, NorthStar, and other computer companies by releasing its own versions of the most popular software while encouraging software publishers to produce compatible versions. Since issuing a CP/M program for a new format is relatively easy, publishers often oblige.

Another way to obtain IBM compatible CP/M-80 software is to purchase it in another format and convert it to work with Baby Blue. A "convert" program is included on the disk provided by XEDEX. Ac-

cording to XEDEX, the program allows the user to convert programs that are formatted to work on other machines. Part of the "convert" process includes placing 4K of PC-DOS code at the beginning of each CP/M-80 file. The "header" is placed on the file by Baby Blue's software and is invisible to the user. At press time XEDEX was planning to support the following formats: SuperBrain 3.0 (not quad density), Osborne Double Density, the NEC PC-8000, Cromemco single-sided double density, Triumph Adler, Alphatronic, Columbia Data Products, and the new Heath/Zenith 48 TPI format. If the convert program works as planned, you can take an

## **W** **HEN** **the PC is not working** **under its own** **operating system,** **Baby Blue functions as** **a 64K expansion** **board.**

off-the-shelf disk for one of the supported formats and convert the program to run on the IBM PC.

A more cumbersome way to convert software is through data communications. It is possible, says Landgarten, to connect almost any CP/M computer to an IBM and "port" over the software from one machine to the other. This is done through the communications ports of both the CP/M machine and the IBM. It can be done by cable or by sending data via telephone. A serial communications port and/or a modem are optional on the PC. The disk that accompanies Baby Blue contains a program that will attach the necessary PC-DOS "header" to the front of the CP/M program, and XEDEX will sell you software that enables the IBM to receive CP/M files. But you will also need the appropriate communications software for the sending computer.

The fourth method for obtaining software is through a service that XEDEX plans to offer. For about \$100 per disk XEDEX will transfer existing CP/M programs and data to a format that can be read by Baby Blue.



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## Some Software is Not Compatible

Regardless of how you try to transfer them, some CP/M-80 programs will not work with Baby Blue.

The first limitation is that the programs must fit within the physical limitations of the PC. If the program requires 400K of disk storage, it cannot be stored on a standard 160K PC disk. It might, however, be possible to run the program if the PC is equipped with a hard disk or a higher capacity eight-inch floppy disk. Programs that won't run under CP/M 2.2 won't run on Baby Blue. Baby Blue will also fail to support programs that use what Landgarten termed "primitive disk calls," such as calling upon the disk operating system to "read a certain sector." Such calls, according to Landgarten, "are most likely to show up in disk utilities you aren't likely to use anyway." Other programs that will not work include those that are dependent on specific hardware of the computer or display device. Programs designed to run on an Osborne computer or a SoftCard equipped Apple are not going to run on an IBM or any computer other than the one for which it was designed.

Transferring programs from one machine to another can also interfere with the licensing agreements that users sign with the software publishers or distributor. In recognition of that, Landgarten cautions, "We are not providing the convert program so that people can take software they run on one computer and convert it to the IBM. The purpose is to allow users to buy software immediately that has already been written rather than waiting for it to be rewritten on the Baby Blue format."

## Does It Work?

A prereleased prototype of Baby Blue arrived at our office just in time for this issue. This article was typed on the IBM with the CP/M-80 version of WordStar. It is virtually the same WordStar that for years has been the word-processing workhorse on most microcomputers. XEDEx has improved the program to take advantage of the PC's cursor control and function keys. They also provided us with a special version of the SuperColc spreadsheet program to run on a Baby Blue equipped IBM. Both SuperColc and WordStar worked as advertised and both created data files in standard PC-DOS. Using a BASIC program written by one of our editors, we were even able to convert Baby Blue's WordStar files so that they

could be edited with the EasyWriter and VolksWriter word-processing programs.

PC did not test the convert program, nor did we attempt to "port" software from a CP/M system to a PC.

## Will It Become Obsolete?

Baby Blue might get you through the current software drought, but in time there is bound to be a plentiful supply of software written for the PC's native 8088 processor. If the programmers are as farsighted as the PC's hardware designers, much of the new software will be better suited for the PC than that which will run on Baby Blue or any other Z-80 processor. Six hundred dollars is a lot of money for a stop-gap measure, but Landgarten points to several reasons why his Baby should have a long and useful life. First, it adds 64K of memory that can be accessed by IBM's processor. Baby Blue sells for only \$40 more than a 64K IBM memory board and, like a memory board, it takes up only one expansion slot, although a number of companies have introduced single-slot boards that provide up to 256K of additional memory. Baby Blue also adds another

**B**ABY BLUE  
*creates compatibility  
by providing a Z-80  
based "computer  
within a computer."*

processor to the IBM, which XEDEx says will later be able to perform chores while IBM's 8088 processor is busy doing something else. For example, using as yet undeveloped software, the Z-80 could be sending text to a printer while the 8088 is running a text editing program.

## Will It Meet Your Needs?

Whether Baby Blue is for you depends on your software needs. If you can be served by software that runs with PC-DOS or CP/M-86, you probably don't need any "babies" in your system. As a general rule, before buying any hardware, be sure it will run the specific software packages you need. But if you want to run programs that are available for the Z-80, then this Baby may bring joy into your life. /PC



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# PC-DOS Wins One

*CARE Computer's MatchMaker lets PCs use software from Datapoint's DATABUS operating system.*

**B**eginning in September, CARE Computer Systems plans to offer a software product that will open up a veritable catalog of applications programs to the IBM Personal Computer. The Bellevue, Washington firm is currently testing *MatchMaker 8600*—a program that converts Datapoint minicomputer software into programs compatible with IBM's PC-DOS operating system. To develop the product, the company abandoned a previous project working toward compatibility with the CP/M operating system.

"The effect of our product," says Gerald Nelson, executive vice president of CARE, "will be to bring a 437-page book of seasoned, third-party software from Datapoint's catalog to the PC user. Those are field-tested, existing applications programs that have been available for years."

CARE markets systems built around Datapoint computers, specializing in general ledger and medical records-keeping software for nursing homes; they install Datapoint minicomputers on customers' premises, and also operate a remote computer service bureau (with an IBM mainframe) for some 800 clients. The idea for *MatchMaker 8600* grew out of a desire to make use of microcomputers.

"Our software is written in DATABUS, Datapoint's operating system language, but it's not easily transportable into BASIC or COBOL or other languages that a micro could use," Nelson says. CARE was impressed by CP/M, and found a computer manufacturer that—at first—was willing to support their conversion costs, but later backed out of the project.

"Then the PC came along. It made me nervous that we were going in one direction—8-bit CP/M—and IBM was going in another—16-bit machines with greater memory addressability. Now, the Datapoints are 8-bit machines, with multi-user capabilities, but that's hard to achieve on microcomputers. The IBM PC seemed like a good product, and we figured we'd rather bet on IBM and be on their side of the line than be against them. We re-targeted

the conversion of DATABUS from 8-bit CP/M to PC-DOS."

Mike Orr, who actually did the conversion, was formerly a product manager for the business-oriented COBOL language at nearby Microsoft, and he describes the project this way: "DATABUS is inherently an interpretive language, even on the Datapoint. What that means is that the software is processing every instruction one step at a time, so the user sees only the high-level, English-like language, and the machine sees only its elementary machine language. There's an 'interpreter' between them.

"For turning DATABUS files into PC-DOS files, we created an interpreter that translates the DATABUS instructions into pseudo-code, an intermediata step that can then be translated for each operation. There is an alternative approach, called a compiler," Orr explains, "that would take an entire program and translate it into machine language, but the advantage of our approach over the compiler approach is that it is smaller and more easily portable among different machines. The major disadvantage is that it is slower than a really well-done compiler can be.

"But the interpreter is really a bridge—you can call it a 'portable bridge'—to other 16-bit processors, and to other operating systems besides just PC-DOS. Ultimately we'll be making DATABUS conversions to the Motorola 68000 chip and to UNIX operating systems."

The first applications software that will use the PC instead of a Datapoint will be CARE's own *VistaCARE* system for nursing homes, and CARE does not expect to make further translations itself. Rather, says Nelson, "We will make *MatchMaker 8600* available to the 50 other Datapoint OEMs" (companies that develop products using Datapoint computers) and "open up the PC to them."

**/PC**

*Hal Glatzer is a journalist and television producer who describes himself as an "explainer." His latest book is Introduction To Word Processing published by Sybex.*



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## At The Faire

The West Coast Computer Faire, held annually in San Francisco, has been a tribal rite of the microcomputer industry since 1977, when the Apple II and Commodore PET computers made their public debuts there. The Faire is not exactly a trade show, nor a convention or conference; descriptions like "gathering of the clan" or Hal Glatzer's image of "The Big Game" seem to capture its spirit.

While there are sizable microcomputer industry outposts elsewhere (Boca Raton, for example), and the roots of the industry can be traced to Albuquerque and other places, the San Francisco Bay area and neighboring "Silicon Valley" have become to microcomputers what Detroit is to autos and Pittsburgh is to steel—home base. So each year the clan comes out to the Faire to revel and swap stories. And the clan keeps getting bigger, with the crowd swollen ever more by fascinated onlookers and would-be initiates. Prod-

ucts are shown and lectures given, but not with the blue-sail or pipe-and-tweed atmosphere of more traditional events. Attending the Faire is an experience unto itself.

At last year's Faire IBM was an official exhibitor. Asked when her company was going to introduce its "real" personal computer, an IBM representative pointed to the Model 5120 on display and said, "This is it." (Four months later we all knew better.) In 1982 IBM itself didn't exhibit. But the presence of the PC was everywhere—the biggest source of excitement in the place. PC magazine was there too, hawking our wares and checking out the scene. Following are several reports from PC staffers.

**T**he West Coast Computer Faire was like a homecoming weekend for Silicon Valley alumni. At the vernal equinox—a cool, green moment be-







fore the waxing sun baked their grasslands brown—some 40,000 people crowded into San Francisco's stadium-like Civic Auditorium and Brooks Hall for the "big game."

Hundreds of team players drew the crowd in, their pennants and jerseys proclaiming brand-name and no-name goods, arcane peripherals, and exotic languages. Those celebrating the rites of spring had their ceremonial "king" in Faire organizer Jim Warren, who made himself ubiquitous on roller skates.

The Faire offered me a chance to see how far the IBM Personal Computer team (which had moved to Boca Raton, Florida from Armonk, New York) would go against the home-town boys and girls of Northern California's indigenous industry.

Yet IBM itself was conspicuously absent, and it was not the only league leader to stay off the field: Atari, Zenith, and Microsoft set up no booths, and the latter two asked only the trade press "sports-writers" to attend their news conferences. Instead, resellers and dealers represented them, going head-to-head with Apple, Os-

borne, Radio Shack, and other first-string players who were there in person.

Around the Faire at least two dozen booths had a PC on display, and many more had flyers that swore that their hardware or software was—or soon would be—running on the PC. In this wide world of computer sports, some exhibitors' literature reminded me of TV wrestlers in before-the-match interviews, shouting gruff and bluff promises of strength; others were more soft-spoken, like golfers who have played only 9 of 72 holes in a tournament.

One company, Datamost, proclaimed that their software, *WRITE-ON!* ("It is part of the name, by the way) was "easier than EasyWriter," as "powerful as WordStar," and "a program editor too." To them things like word wrapping, variable inserts to form letters, print formatting and text merging were unique features.

More subtle was Quadram Corporation, which modestly touted its memory expansion board for the PC this way: "The first mass-produced IBM cards [sic] shipped by a supplier other than IBM. . . With four cards being shipped, Quadram

has become one of the leading suppliers of IBM peripheral boards." Did they mean four varieties or just four boards? (And I thought I knew what "IBM cards" were—those things you're not supposed to fold, spindle, or mutilate.)

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## **E**XHIBITORS' literature reminded me of TV wrestlers in before-the-match interviews—gruff and bluff.

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Team sports again: A club that has been on the field since the beginning of the PC game showed off its latest player. Information Unlimited Software, Inc. brought out *EasySpeller* as a teammate to its *EasyWriter* word processor.

*EasySpeller* has a built-in dictionary of 88,000 discrete words and showed itself to be very user friendly, giving full-sentence explanations of its activities. "EasySpeller does not recognize this word at all," appeared when a word in the file was not found in the dictionary, and "EasySpeller sees improper capitalization," showed up when an ordinary word was capitalized as a proper noun. *EasySpeller* accepts non-*EasyWriter* documents and will proofread any PC-DOS-created files, including BASIC and FORTRAN programs.

A potentially dangerous competitor to the PC-DOS software jockeys was a piece of hardware delicately called "Baby Blue" (a pun on IBM's corporate nickname, "Big Blue"). The product is a microcomputer on a single-printed circuit board that allows programs for the CP/M operating system to run as if the PC were an 8-bit, CP/M-compatible microcomputer—the very computer IBM had hoped to render obsolete by using the 8088 16-bit chip. Since there is still little software that takes full advantage of the 8088, Baby Blue may fill in the gaps. But if 16-bit software (written for PC-DOS or CP/M-86) comes down the pike soon, Bob Dylan's lyrics may be heard blowing in the wind: "It's all over now Baby Blue."

So here's the latest from the press box at Silicon Valley Stadium, over radio sta-

## Giveaway Winner Drawn



For a few moments, the PC exhibit booth became the center of attention at the West Coast Computer Faire, as Jennifer Pottier (daughter of PC's production manager Jacqueline Pottier) drew the winning name in our promotional giveaway of an IBM Personal Computer. As a dense crowd pressed around, Jenny gamely plunged her hand into the barrel and drew out the entry of Paul Hardiman of Milwaukee. The response to PC's drawing was one more indication of the intense interest IBM's PC elicited from Faire attendees.



tion WCCF: The team from IBM has yet to knock anybody out of the running, but don't let the first innings fool you. The name of this game is hardball.

## Surrender at the Faire

I arrived at the West Coast Computer Faire as a freelance writer in search of anything new and exciting in the world of computers. Having no bias toward any particular system, I wandered through the cavernous convention stopping at whatever booths struck my fancy. After three days of non-stop talking and gawking, I surrendered my free-agent status.

Within a week I signed on as an editor at PC, and I just took delivery on my own IBM Personal Computer.

I didn't need the Faire to convince me that the PC was an excellent computer. Like a lot of people, I was holding back until I saw adequate software and hardware for the machine. There are a lot of excellent computers on the market, but what makes a machine exciting is the support it gets from others—software authors, equipment manufacturers, users groups, even book and magazine publishers. Any

lingering doubts were erased by my experience at the Faire.

The Faire pierced certain myths about IBM's new computer. Myth One: Limited software. Software may have been limited in October when the machine was released, but a lot of programmers have been burning the midnight oil in the intervening six months. The Faire had enough software offerings to satisfy some pretty diverse demands.

Faire goers in search of word-processing software could view demonstrations of *VolkWriter*, *Select*, and *Write-On*, and Norell Data Systems promised the imminent release of *EasyText*.

Spreadsheet shoppers were not limited to IBM's *VisiCalc*. "Calcalikes," it seems, are *faire* game. Sorcim was showing *SuperCalc* while others were claiming that their electronic spreadsheets were just around the corner.

PCers in need of communications software were not bound to IBM's *Asynchronous Package*, since *Micro-Link* made it to the Faire. Data Base management needs could be filled by Norell's *EasyData*, ISU's *EasyFiler*, Washington Computer Service's *Record Management System* and two packages from Johnson Associates.

Games, though not plentiful, were displayed by *Stoneware* and *Digital Marketing*. There was even a program called "The Programmer," designed to help you write your own programs.

While there weren't as many software packages as there were for Apple, TRS-80, or CP/M microcomputers, there were plenty from which to choose.

Myth Two: The PC is expensive. Faire

goers were treated to add-ons that transformed the PC into a bargain system. Davong's *Faire Special* included a 192K memory board for \$599—\$39 more than IBM's 64K board. To store the data generated by all that cheap memory, they also showed a \$1,995 five-megabyte hard disk. These disks hold 31 times the data of an IBM floppy at 3 1/2 times the price.

Buyers of color monitors could see the light for a lot less. Both *ATI* and *Electro-Home* had color monitors for less than \$600. *Berkeley Micro-Computer* was one of many companies selling memory chips. They also had a six-foot extension cord for the PC keyboard.

Engineers, programmers, scientists, and system designers also had products from which to choose. *Hurricane Labs*, for example, was showing its PC prototype wire rap and expander boards, and promising lots more for the future. *Basic Business Software* demonstrated a series of utility programs to take some of the drudgery out of programming. They also offered some pretty sophisticated statistics packages to run on the PC.





Even would-be entrepreneurs had a chance to cash in on the PC bonanza. The Software Emporium offered franchises to anyone "with a modest amount of capital and a willingness to work hard." The PC was the most prominently featured computer in the Emporium's prototype advertising.

For every firm that had a PC product at the Faire, there were several that had some in the works, not yet ready for exhibit. Need proof? Check out this issue's "New on the Market." If that's not proof enough, stay tuned. Next year's Faire might just be a PC Carnival.

—Larry Magid

## The Programmer Previewed

The most tantalizing booth at the Faire for me was that of Advanced Operating Systems. They were showing off a nearly finished version of *The Programmer*, a program to help write other programs. I wanted a copy the minute I saw it.

*The Programmer* is not one of the so-called "programs that program." It is a program that helps you write programs in BASIC. By far its nicest attribute is that it takes in the full range of the PC's capabilities: graphics, sound, communications, etc. Menus in the program present you

with choices of all the things the PC can do. The screen graphics menu, for example, includes a choice to draw a line; and if you select this, *The Programmer* will then ask you where the line should start and stop, what color it should be, and whatever else it needs to know. By showing you listings of the PC's features in this way, the program keeps reminding you of all the things the PC can do.



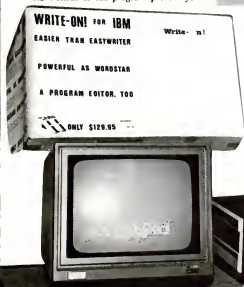
Making a program this way is a little like stringing beads. You still need to define what you want a new program to accomplish; but once you do, you just outline the steps, and *The Programmer* turns it into a BASIC program. While in the bead-stringing stage, you can shift back and forth between *The Programmer* and your evolving program to check how it's coming along, then go back for changes or additions. If the eventual product lives up to the preview, this one's going to be a biggie.

—Jim Edlin

## Word-Processors Proliferate

One obvious message from the Faire exhibits was that PC users will have plenty of choices about what they use to process words.

The cottage-industry corps had already been hard at work. In a small booth tucked away on a mezzanine, Camilo Wilson (above left) showed off his *Volkswriter*





program—aimed at those seeking simplicity. Downstairs, DataMost was marketing a version of Write On! that Betsy Speicht (right) had rapidly adapted from its original version for the Apple II computer. [The manual binder bore apple pictures,

## **SOME 40,000 people crowded into the stadium-like Civic Auditorium and Brooks Hall for the big game.**

but a sticker was affixed that said "IBM Version.")

The makers of IBM's chosen software, EasyWriter, previewed a newer and different program, EasyWriter II, that they will be marketing on their own. And other companies, while not yet showing their products, certainly wanted to make sure you knew they were coming. These included Sorcim Corp., publishers of the SuperCalc spreadsheet, which was talking up a companion SuperWriter program, and Select Information Systems, who had their Select program demonstrating on several machines including the Xerox personal computer. Select's Zev Rattet said the IBM PC version of the program was just about to be released.

## **PC Panel Draws Standing Room Only**

The Computer Faire's three-hour panel discussion entitled "The IBM Personal Computer" drew a standing-room-only crowd of more than 500 information-hungry individuals. They turned out to hear a panel that included such stars of the PC firmament as Microsoft's Bill Gates and Digital Research's Gary Kildall. The only missing ingredient was a representative from IBM itself, and though none were on the podium, some visitors from Boca Raton were spotted in the audience. The session was organized by John Reut-

ter, president of Megasoft, a software systems company that is developing educational and entertainment software. In addition to scoring the coup of getting rival software authors Gates and Kildall on the same stage, Reutter assembled two hardware manufacturers—Martin Alpert, president of Tecmar, and Bob Lindgren, vice president of marketing at DataMac Equipment Corp. Other speakers at the session included Fred "Chip" Pood, senior vice president for mergers and acquisitions at Micropro International; Richard Mandel, national products manager at ComputerLand in Hayward; PC publisher David Bunnell; and PC founding editor Jim Edlin.

Each panelist gave a 15- to 20-minute talk followed by a few minutes of questions and answers. Here are some highlights.

### **John Reutter, Megasoft**

For three to four years many of us speculated about when IBM would drop its bombshell and legitimize our industry. In August 1980, IBM began forming the proj-

ect and put together 250 PC "freaks" within IBM. I had a number of friends at IBM who had their own PCs—some of the early ones. They had to hide the fact that they had them. It wasn't an accepted thing to go home and play with your PC if it didn't have an IBM label.

The project was completed in less than a year. And the software that was sold to the public for three to four years, with thousands of bugs in it, was found and corrected before IBM introduced its computer onto the market. This was to maintain respectability.

IBM is one of the very few companies in the entire world that overnight could create a billion-dollar industry.

### **Bob Lindgren, DataMac**

I talked with a lot of the ComputerLand Store owners—the ones who have been around for a while, who have been through the Apple. They said the Apple would be a ripple on a pond. But the IBM seems to be a tidal wave. And it doesn't



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seem to be subsiding at all.

Memory is an area that, as users, you're gonna have to look at. If you look at IBM's announcement, they say the maximum configuration would be 256K. Remember, with five expansion slots, when you take a floppy and you take your monitor and your printer, you're left with three expansion slots. The obvious thing was to increase the density of the board. We wondered why they didn't increase the capacity of the board.

The other area that we looked at on a PC that was interesting and seemed to be similarly deficient was the amount of floppy disk storage offered. IBM used Tandon drives and the 40 tpi drives, which gave a capacity of 160K. So really you have a floppy storage problem, especially with some of the software that's being supported. You need certain data bases that you can't get to with those sized floppies.

#### Dr. Martin Alpert, Tecmar

Tecmar has developed 26 products for the IBM PC. By virtue of handling these

products, we've been able to learn a great deal about the PC and our market.

Many users are first-time users without significant technical background, which is why quality of product and high reliability are so vital.

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**I**  
**BM**  
*is one of the few  
companies that  
overnight could  
create a billion dollar  
industry.*

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There are certain product omissions that were obvious. And IBM, by providing complete documentation, facilitated third-party hardware vendors' meeting those needs. High-density RAM, Win-

chester drives, and expansion chassis were some of the products. You can now find literally dozens of manufacturers of memory for the PC. Most of these commodity products are very similar, with a few variations. It is the peripherals that make this PC acceptable to a multitude of applications. It is these peripherals that give this PC personality.

New software can be used to add new functions to the hardware. For example, at the show, we've announced software products that allow the standard memory board to act as a disk.

IBM has set very high standards that this industry must also adhere to.

#### Fred "Chip" Poed, Micropro

The projection before IBM entered [the market] was that we'd have between one and two million micros out this year. They're now forecasting four and five million by 1985.

Professional and business people are by far the dominant users of microcom-

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your computer print out the forms you need for data processing, word processing, graphics, accounting or other business applications.

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puters. We feel it's the needs of the office that are the driving force behind software development. ComputerLand stores in New York and MIS Week in February 1982 recorded that 93 percent of the PCs are purchased by businesses, both small and large.

We perceive that the trends in software are three-fold: (1) The needs of the office environment are going to be crucial to the development of applications software; (2) The entire office environment needs to be integrated; (3) One of Micropro's intents is that our software will allow Bill Gates to recommend the IBM PC to his mom. It must be easy to use and alter.

Canned application software has a major problem. The likelihood of satisfying everyone is virtually impossible. There have been accounts receivable (A.R.) as long as there have been professions. Yet nobody's ever come up with a definitive A.R. package, because businesses are all different. All packaged software is just an approximation of what the user wants. A more powerful microcomputer from the world's largest computer company is not going to change this fact. The problem will become worse as whole new types of users absolutely unknowledgeable about data-processing enter the microcomputer world. We feel the answer lies not only in better hardware, but, specifically, in better software.

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**ONE**  
*of MicroPro's  
intentions is that our  
software will allow  
Bill Gates to  
recommend the IBM  
PC to his mom.*

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Hardware is interchangeable. You have much more invested in learning how to use a piece of software. We want to capitalize on that investment for you by having you learn one piece of software and making the next piece that much easier to learn—keyboard techniques are the same, operator techniques are identical, menu

schemes are the same, prompts are the same, data is compatible between programs... It has to be. If we don't do it, someone else will. And we intend to be number one.

### **Bill Gates, Microsoft**

*(Gates wrote the first BASIC language for a microcomputer and is, in Reuter's words, "singlehandedly responsible for creating our industry.")*

We have today a 16-bit world. (The PC) is the first of a new class of machines that will become increasingly important.

Some of the key packages now on the IBM machine (VisiCalc, EasyWriter) never existed in the 8080 environment.

There is a very large user base out there today developing systems under MS-DOS.

Lifeboat Associates will be publishing a wide variety of applications in MS-DOS environments, and that's important. That's the type of momentum that leads to an operating system being accepted as a standard.

I think everyone's aware, in the case of the machines today, that you can buy a nice peripheral, but in most cases the applications won't take advantage of it.

I expect most work for IBM machines will be done in a high-level language. The extra power of the instruction-set means that the inefficient cost for working a high-level language is greatly reduced from the 8-bit environment. The key reason for working in machine language in the 8-bit environment was the limited address space, and that is something the IBM PC solves.

I think you'll see packages that'll demand more and more memory. I encourage you to get a board that's expendable, even if you only go with the 128 initially.

### **Dr. Gary Kildall, Digital Research**

We transported fundamentally the same environment into the 16-bit world to provide transportation paths for software vendors... the same function calls, the same memory organization, and the same base page. Everything is fundamentally the same, with extensions to handle mem-

ory management and multi-resident programs.

The common mode of operation for 16-bit machines, including the PC, is going to be a single-user, concurrent system.

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**I EXPECT  
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machines will be  
done in a high-level  
language.**

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One thing we'll see in the 16-bit world that will be a change from the 8-bit environment is that the professional programming languages will become more incredible. You'll see some migration away from small basic systems and into COBOL and PASCAL environments.

### **Jim Edlin and David Bunnell, PC magazine**

Jim Edlin and David Bunnell discussed customer trends (Fortune 500 companies, small businesses, and professionals are prevalent), made future projections (by the third quarter of 1982, IBM will be shipping 1,000 PCs a day), and opened the Pandora's box on a new rumor, that IBM will open a PC manufacturing plant in upstate New York and one in France. "It's important to be first," said Bunnell, "with a magazine or a product."

### **Richard Mandel, ComputerLand**

Mandel touched on several key issues involving PC sales and development. High points of Mandel's presentation centered on:

- ComputerLand's role in convincing IBM to publish the PC schematics. (ComputerLand was involved quite early in PC's development.)
- First-quarter ComputerLand sales, which indicated that all line sales expanded as a result of PC's entry into the marketplace.
- Emerging sales patterns. The customer base for the PC consists of Fortune 1000 Companies, which tend to install multiples—50 to 1,000 machines per firm.

—Kathleen Burton



# Discovering The Source

A network novice's initiation into the uses of a telecomputing service.

Three weeks before my IBM Personal Computer was to arrive I signed up for The Source information and communication service. I had only a vague hint of what its computing power could offer, but the concept of an electronic resource—an array of services available from the comfort and convenience of my home—seemed particularly appealing.

I purchased a subscription to The Source to access its large data base, to get late-developing financial information, and to monitor legislation in health care from Capitol Hill. Initially I focused on the information library that was available, but I soon recognized the communication possibilities inherent in this new medium. A user can receive news, transmit text, reproduce documents, and rapidly communicate information to a specialized interest group that know each other only through the electronic service.



Illustration: Mark Wiggett

## IBM Post

One of the features of The Source is POST, a classified ad and bulletin board service. Subscribers participate in open

POST listing. Naturally I accessed the IBM POST, and I found it immediately helpful.

Every evening messages appearing on the POST brought me new information about the PC: additional software, hard-disk availability, data on RGB monitors, problems with features, and recommended peripherals.

Since this was my first computer, I had many questions about its use. One immediate problem I noticed while using the communication package was the backspace feature, which should delete incorrect characters. Instead, card-like symbols in reverse video would appear on the screen and alter the communications flow. I inquired if anyone out there in Source-land could help me.

My POST communicate was answered immediately. This was a software problem, and its correction required a simple patch.

Furthermore, I wanted to be able to print out material from The Source while it was appearing on the screen. IBM's communication package did not provide for this. I sent out an inquiry on the POST for assistance. Very quickly people re-

sponded who had already developed a solution. They sent me a few simple modifications to the IBM package, which allowed me to echo the screen in ongoing print-out. Here were experienced and technically proficient programmers sharing information to help solve those problems.

As questions and answers popped up night after night, I realized that I had become part of a network that was effectively overhauling the IBM asynchronous communication software and making it a practical tool for the needs of home users.

## PC Gazette

Following The Source's menu led me to an option called "user publishing." It allows subscribers to set up files that are available to all. One individual has created a category called *The PC Gazette*, a file of information about the machine. It contains communications going back to 1981. It also has an index of articles published in PC magazine, a listing of available software, and prices from IBM product centers. One can learn about user groups starting to form throughout the

(Continued)

**T**HERE'S  
something magical  
about typing a reply to  
a letter and knowing  
it's instantly in  
another person's  
mailbox.

forum to trade goods and services, discuss topics of mutual concern, and establish interest groups. Anyone can send up to 23 lines on the POST free of charge within 75 subject categories. Photography, antiques, aviation, even apartments for rent are shown as separate POST categories. Each of the popular computers has its own



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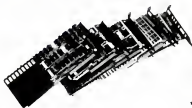
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## About The Source:

The Source service can be used by almost any personal computer or computer terminal. Source transmission is accomplished through either of two telephone networks, Telenet and Tymnet, which are reached via an ordinary telephone call.

IBM Personal Computer owners wishing to use The Source will need a modem, which connects the computer to a telephone line, and an asynchronous communications card with an RS-232 serial port. One can reach The Source through the COMMBAS program included with IBM's disk operating system (PC-DOS). Communications software sold separately can also be used.

A subscription to The Source costs \$100 and may be purchased from retail computer stores or directly from Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102.

The subscription is a one-time-only fee. Charges for actual use of The Source are based on connect time and type of service

accessed, although there is a \$10 monthly minimum. Rates vary with time of day, from \$4.25 an hour between midnight and 7 a.m. to \$18 an hour for prime-time use (7 a.m. to 6 p.m. Monday through Friday).

A new, advanced data base called Source Plus is available at additional cost. Source Plus features include commodity reports and recommendations, a record of bills before Congress, and Comp-U-Star, an electronic department store. Books, major appliances, tools, tires, cameras, and carpeting are among the items that may be purchased through Comp-U-Star. A worldwide trading network and a customized information research service are also available through Source Plus.

New subscribers receive a host system number, a six-character identification code, and a personal password. These numbers must be entered correctly, in proper sequence, to connect with The Source.

Subscribers also receive a user's manual,

which we found intelligently written, well documented, logically arranged, and adequately indexed.

There are two routes to maneuvering through The Source. It appears designed with operating simplicity in mind, and people with little or no previous computing experience should become proficient quickly in its use.

A menu screen displays a set of alternatives, and selection usually leads to a submenu of additional options. A choice there may lead to yet another group of categories. As you become familiar with The Source, you will probably choose to bypass the menus and type in direct commands.

One can also switch rapidly from one application to another, from accessing information to actual communication.

The Source will automatically disconnect if no activity is registered at command level after three minutes.

—Stuart Schwartz and Ellen Wilson



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(Continued from page 67)

country and track the evolutionary development of the PC.

## CHAT

During my first week on The Source, I

was reading UPI news when something flashed on my screen: some call letters, a small identification, and a personal introduction. "Would you like to chat?"

CHAT is a feature that allows typewritten conversation with another subscriber.

## Fix for IBM Communications Program

The following change corrects a problem IBM's asynchronous communications program has with handling backspaces. (IBM apparently forgot there might be more than one character in the input buffer.) To make the change, load the BASIC language, insert the communications program disk, then type `LOAD "TERMINAL.BAS"`. When the program is loaded, type the following lines:

```
2005 ON=512+ASC(BKSS):CALL SS(C%,T%,O%,E%)
5106 IF RIGHT$(B$,1) <> BKSS THEN 5110
5107 IF LEN(B$) > 1 THEN B$=LEFT$(B$,LEN(B$)-2) ELSE GOSUB 2720 : GOTO 5200
SAVE "TERMINAL"
```

The modified program will then be stored on your disk. Line 2005 forces the base program to terminate a buffer read at a backspace character, if there is one, so only the rightmost character needs to be tested in 5106. If there is more than one character in the buffer string, then line 5107 removes the backspace and preceding character before letting the buffer be printed to the screen, otherwise it calls an existing subroutine, which backs up one character position on the screen, prints a space, and backs up again.

With thanks to Morris E. Thompson, Jr. of Dallas, Texas (Source TCS923), who originated this change.

I had read about CHAT in the user's manual for The Source, but it didn't prepare me for the reality of this stranger coming into my home electronically. I was shocked but managed to respond.

Most conversations centered on computers and their uses. Through the CHAT feature I met a graphics designer in New York, a baccarat dealer in Las Vegas, and a Detroit TV technician who offered me a place to stay when the San Francisco Forty-Niners went to the Super Bowl.

One random contact on the electronic network turned into an amazing coincidence. I found myself chatting with an old friend of my brother's who I had heard about but had never met.

## SMAIL

The POST and CHAT introduced me to a group of people, and I began to communicate regularly through a feature called SMAIL—Source Mail. Each subscriber has a mailbox, a 2,000-character storage bank accessed with a simple command. This feature allows for rapid communication of information to an individual or a group of users. There is something magical about this instant communication—about receiving a letter, typing a reply, and knowing it is instantly in another person's mailbox. This feature can be an enormous

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*shocked but managed  
to respond to this  
stranger coming into  
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timesaver and a useful business link. The only drawback I have experienced is similar to that of a traditional mailbox—finding unsolicited announcements and publicity mail.

The Source was established in June 1979. In October of the following year it was taken over by Reader's Digest Association. Seven mainframe computers were purchased, new data bases added, and response time improved. The user's manual was rewritten and a system of on-screen menus was devised to simplify access to its services.



# Expand Your IBM P.C.

At this writing The Source says it has 16,786 subscribers, 1,500 added during a recent month. Mike Rawl, manager of corporate communication for The Source, says every month a new subscription record is broken.

I think services such as The Source represent a shift toward more efficient methods of conducting routine business and, more significantly, a change in the way we collect, manipulate, and share information. There are infinite possibilities, and a user may never know them all.

## Some Caveats

I doubt, however, that such services will supplant the printed page. There's an optimum amount of time one can spend watching information scroll across the screen. For me it seems to be 60 minutes at a sitting.

Also, the expense of usage can add up quickly. One has to compare the cost of writing text, playing games, and developing programs on The Source against the cost of purchasing equivalent software.

The general novelty of CHAT soon wears off. CHAT is a great equalizer and a means of expanding social networks, but after three weeks I was an old-timer. There are just so many ways you can ask someone, "What kind of computer do you have?"

The future value of The Source depends not upon the company as much as the subscribers. Continued use will be based on specialized interest. It gives us a chance to interact, to present problems, and share solutions.

I view a subscription to The Source as similar to having a million diskettes available for use; a personal storehouse of data on business, finance, science, public affairs, sports, education, and employment; an entertainment library containing 74 games; and six dozen bulletin boards where you can place notices to buy and sell equipment or exchange ideas. With each passing month it seems more evident that my green screen will become an expanding window to the world. /PC

Stuart R. Schwartz, M.D., is a Clinical Professor of Psychiatry at the University of California School of Medicine. He was assisted in the writing of this article by Ellen Wilson, a self-proclaimed cyberphile who is proprietress of The Electronic Cottage, a home-based computer processing service.



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# Used Apples

Are you an Apple II owner who looks longingly through the window of your IBM dealer's, wishing you could trade your old Apple for a new PC? Take heart. The sale of your used Apple may go a long way towards paying for a new IBM Personal Computer. Used Apples hold their value and are relatively easy to sell.

This article is for Apple owners who are thinking of selling their system to buy an IBM. Some of the tips will also apply to Radio Shack or other equipment. I am not trying to convince anyone to part with his or her old computer. Some IBM PC purchasers are finding constructive uses for their old Apples, just as some societies provide their able elders with useful jobs rather than forced retirement. Read on if

you can't afford or justify keeping an extra computer around the house or office.

## Making the Decision

The first task in "trading up" is to make the fateful decision. That means taking stock in your equipment, software, and data as well as present and future needs. It's like any buying decision. But changing from one system to another means letting go of an investment in time, money, and, for some, emotional attachment. Remember, the IBM is a recently released system, so the realization of its full potential lies in the future. A system as powerful as the IBM PC can, in the long run, perform tasks that have yet to be attempted by earlier computers such as the Apple.

Consider the value of your hardware, software, and data. When evaluating software, separate that which you really use from what you have around but hardly care about. If you absolutely need applications that can be run only on the Apple, and there is not yet software that allows the IBM to perform the same task, then the decision to trade is premature. If, on the other hand, your important applications are focused on such tasks as word-processing, budgeting, and data-base management, the IBM may already have as good or better software than what you now have on the the Apple. With the introduction of Baby Blue (see story this issue), the PC can now run most software written for the CP/M-80 operating system. If you are one of more than 30,000 people running an Apple under CP/M, chances are good that you can continue to use IBM versions of your current software.

You should also consider the value of the data you are storing on Apple diskettes. For some users, that can add up to a huge investment. There are ways to transfer that data. Files can be transferred via a communications adapter directly or over the phone. In some cases they can be uploaded to The Source, CompuServe, or some other host computer and then downloaded to your new IBM. ComputerLand dealers sell both IBMs and Apples, so if you buy a PC from them, see if they can help you make the transfer. If worse comes to worse, you can print out all the data and re-enter what you wish to keep.

The price you can get for your used Apple depends, in part, on the new retail value of the components. Many people think the IBM is much more expensive than the Apple II. The difference is less





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than you might imagine, and, in many configurations, an IBM is actually cheaper than a similarly equipped Apple II.

### What's the Blue Book?

Of course the value of your Apple depends on how it is equipped and its condition. Because well-made computers deteriorate very slowly, your system is probably as good as new.

One of the reasons for the Apple II's high resale value is that it is still a production model. Despite the introduction of the Apple III, the II remains a very popular computer. Four years after its introduction as one of the first personal computers, the Apple II is still a sales leader. Apple has reported a 98 percent increase in sales, comparing the first quarters of fiscal 1981 and 1982. The majority of those sales are for the Apple II. As long as dealers continue to sell new Apples at full list price, some people will be glad to pay less for a good used one. That may no longer be true if Apple introduces a replacement for the II. When Radio Shack introduced the TRS-80 Model III, the used value of the Model II dropped substantially. That's because the Model III was essentially a re-packaged Model I with more features and a lower price tag. Apple has not announced any plans to replace the II, but there is speculation they will, at some point, come out with a more powerful computer at a lower cost.

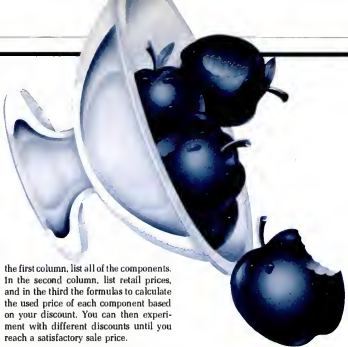
## USED

**Apples are selling for 60 to 80 percent of their initial retail.**

The Apple's high resale price is also a testimony to the excellent reputation that it has earned as a versatile and reliable machine.

Used Apples, if you can find them, are currently selling for between 60 and 80 percent of their initial retail value. When you advertise your system, you should probably allow some room for negotiation. People like to bargain. A little flexibility on your part can help clinch the sale.

A VisiCalc-type spreadsheet program (or its paper, pencil, and calculator equivalent) can help you price your system. In



the first column, list all of the components. In the second column, list retail prices, and in the third the formulas to calculate the used price of each component based on your discount. You can then experiment with different discounts until you reach a satisfactory sale price.

### Should You Break Up Your System?

If your system includes a lot of components, you will have to decide whether to sell them all at once or a piece at a time. You are likely to get calls from people wanting an 80-column card, a CP/M board, an extra disk drive, or part of your software collection. Whether you want to break up your system depends partially on how long you want to be in the business of selling used equipment. One solution is to be willing to sell the Apple and disk drives as one package and the components a piece at a time. It's probably a mistake to sell the components before you sell the bulk of the system. Components are easy to sell if you have access to a computer club or electronic bulletin board. Apple owners are always looking for inexpensive ways to expand their systems. But it will take extra time and effort on your part.

Software is more difficult to sell, its selection being more personal than hardware. If you throw it in free as part of your sale, you may be in a more competitive selling position. Or, once you find a buyer for the hardware, you may be able to convince the person to buy some of your software. Sometimes it is hard to convince a buyer of the value of your software. Even though it is an expensive part of the system, there is a tendency to think in terms of hardware and resist paying for software. Nevertheless, millions of dollars

are spent each year on software and a current release of a "pre-owned" software package works just as well as a new one. The only drawback to used software is that the new owner may not be eligible for updates and assistance.

### Where to Advertise

Chet Lambert publishes the *Computer Trader*, a Birmingham, Alabama based monthly newsletter that brings together buyers and sellers of used computer equipment. He says he recently sold his own dual drive 48K used Apple for \$2,100—70 percent of list price. Lambert claims that Apple ads produce almost immediate results.

The *Computer Shopper* is published monthly from Titusville, Florida. The pages of one of its recent issues carries 16 ads for used Radio Shack Model II and only three for used Apple IIs.

Advertising in a nationally circulated trader directs your ad to a group of highly motivated buyers. National circulation, however, means that you may have to deal with a long-distance buyer. That causes obvious complications, though Lambert claims that his buyers and sellers have always managed to work things out.

For subscribers to *CompuServe* and *The Source*, other national outlets for selling used equipment are the electronic bulletin boards provided on these networks.



Subscribers pay only the normal time charges while they send or read ads. These ads are frequently used to sell components or software, but occasionally entire systems are advertised and sold through the electronic classifieds. Like users of the trader newsletters, arrangements must be made to bring together the buyer's money and the seller's equipment.

Community-based electronic bulletin boards provide a free local advertising option. Most large and some small cities have dial-up bulletin boards, some of which are dedicated to specific machines. Contact your computer dealer or clubs for the phone numbers of these services.

Old-fashioned bulletin boards also work. Local colleges are filled with people interested in bargain computer equipment. Don't overlook posting notices in office buildings and supermarkets.

The most obvious place is the classified section of your local paper. If your paper has a computer section, place your ad in that section. Otherwise, try to get the paper to put a bold heading saying "Computer." Some papers have a special classified section for the business community. That's

probably a better bet than the general classifieds.

If you live in a town with a computer club, you can put a notice on its bulletin board or make an announcement at its meetings. A lot of would-be Apple owners associate with clubs.

**S**oftware  
is more difficult to  
sell. If you throw it in  
free, you may be more  
competitive.

I asked several ComputerLand dealers what they could do for people wanting to upgrade. Though none accepted trade-ins, several said that they would help customers sell their used equipment in conjunction with the purchase of a new IBM. One dealer said he would display the used system as a free service. Another said she

would do so for a commission. All the dealers I spoke with said the used Apple market is slanted toward the seller.

#### Sales Advice From the Pros

Wherever you advertise, give a complete description of your offering and include a price. Chet Lambert of Computer Troder says his advertisers who include price are more likely to get calls from serious buyers. It also screens out callers who have no idea what the system is worth. I spoke with one seller who made the mistake of advertising his \$4,000 system without a price. He was besieged by callers in the market for a \$300 system. Many people have no idea what a fully equipped computer is worth.

If you're paying for your classified by the word or line, you want to keep it short, but it's important that people know what you're offering. Some people think that Apples are just for playing games and are not aware of what can be done with a fully loaded one. Go through your system slot by slot and include each add-on.

People in the market for a used system are, of course, interested in price. Your

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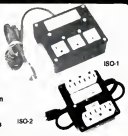
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Each card comes fully assembled, tested and with a 1-year guarantee. Expansion kits are also available.

How to order: RAM+ is available only through your local computer store. Call us toll free at 1-800-426-8936 for the location of your nearest RAM+ dealer.

The RAM+. A great deal for owners of the IBM Personal Computer.



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main competition consists of discount mail-order houses that are selling Apples for as much as 30 percent below list price. Apple has recently decreed that it will not permit mail-order sales, but there are some companies that are defying Apple's orders. The chances are good that the used Apple buyer is aware of those discount houses, so you must make your system more attractive. Undercutting the discounters is one way to do that. Another is to make an offer that the mail-order houses can't possibly beat. You can offer your customer free software, free installation, advice, support, and consultation.

One reason for buying new instead of used is warranty. The mail-order houses do offer the typical 90-day factory warranties. But they are of dubious value if local dealers either refuse to honor them or do so grudgingly. You can offer your customer a one-year extended warranty, which you can purchase from an authorized Apple dealer for \$225. This gives your prospective buyer a sense of security and a positive relationship with a local dealer. Your customer, in many ways, is better off

buying used equipment under these circumstances than buying new through a mail-order house. One dealer I spoke with said that she is much more inclined to provide friendly service to buyers of used equipment than to those who buy through the mail.

## ONE PC owner said he wouldn't consider parting with his old Apple.

You can also offer to have the Apple checked out by a service technician prior to the sale. We checked with several, and most offer a complete diagnostic exam for about \$40. You can offer your customer written proof that the machine is as good as new.

### Letting Go

Perhaps the most difficult part of selling your Apple is the decision to do so. For some people letting go means more than just hardware, software, or data. In our research, we encountered Apple owners with a deep emotional attachment to their computers, just as some people have with their cars. One PC owner said that he wouldn't consider parting with his old Apple. Instead, he placed it in his deceased father's room, supplying it with "lots of games, its own telephone, and plenty of 12-year-olds to play with."

For most users, a computer is a tool, and their buying decisions are based on what the computer and its software can do for them. At some point, most people will reach the moment when it is time to buy their second computer. If you are at that point, you're in a good position to sell.

Anybody want a used Apple? /PC

Lawrence J. Magid is Editor of PC. He is a long-time Apple owner who recently tested the waters by putting his own system on the market.

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# Communications Briefs

## **Source Bulletin Board Devoted to IBM PC**

One offering on The Source information utility's smorgasbord of services is a bulletin board for messages about the IBM personal computer. Anyone on-line may post a message; it will be listed for two weeks or until the writer purges it.

Source members may scan these messages in only one way: reverse order of posting. The content is a mixed bag of commercial ads for software and hardware products, and "ham radio" messaging about various aspects of the PC. (Many users are reporting difficulties with the PC's communications package, a topic that PC will report on in the next issue.) Microsoft Corp. used the IBM bulletin board to announce plans for a nationwide PC users group.

Source member Chuck Reinbrecht of Potomac, Maryland publishes the on-line PC Gozette, an electronic journal. Reinbrecht monitors, edits, and classifies bulletin board items. (He also indexes and comments on the contents of this magazine.) The Gozette, which has published a point-by-point comparison of the PC and the Apple II and Apple III, also maintains a list of PC user groups and a price list of IBM products.

## **EIES Installs More Powerful Host, Plans to Add Uninet Access**

The EIES conferencing network last month switched to a bigger host computer, doubling the number of its communications ports to 48, and announced plans to hook into the Uninet packet-switched network in addition to its current carrier, Telenet. EIES is now operating on a Perkin-Elmer 3200 minicomputer with 2 million characters of main memory. Four 256-million-character disk drives serve the computer, two for on-line use and two for backup.

EIES programmers are using their old host computer, a smaller mini, to develop more advanced software for connection to both Telenet and Uninet. Once this software is in place, EIES said, access rates will probably be reduced. They are now \$7.50 an hour via Telenet; the Uninet rates have not yet been set.

## **Prestel Coming For PC**

Prestel is one version of a new medium called videotex—a sort of cross between traditional publishing and broadcasting. It lets you use a specially set up, computer-like terminal via your phone line to view "pages" of information and advertising that are "published" by storing them in a central computer. Several versions of videotex are in various stages of experimental or commercial realization, mostly sponsored by national governments or telephone monopolies. Prestel is England's videotex entry, and it may be gaining a foothold in the United States via IBM Personal Computers.

Wolfdata, an Ithaca, New York firm, is planning to sell a plug-in card software that will turn a PC into a working Prestel terminal. President Tom Lonergan says: "We see a long-term potential in the videotex marketplace, with the near-term opportunity being business applications." Lonergan explains that the PC was chosen as Wolfdata's vehicle for moving into videotex because "the PC is the most versatile and capable of the current, intelligent desk-top computers." The company settled on Prestel, a relatively Plain-Jane videotex version, because "the overhead for the more complex versions is just not practical yet." But Lonergan also notes portentously that IBM already sells Prestel central computer systems in Europe.

Wolfdata's Prestel adapter is scheduled for June introduction at about \$1,000, including a built-in connection to your phone line that will receive data at 120 characters per second. A model without the phone connector will sell for \$750 but requires that you have an asynchronous communications adapter. Both models require you to have a color display and the color graphics adapter. For \$450 more the company will sell you a program disk that lets you compose Prestel pages on your PC—for those who plan to become videotex publishers rather than users. /PC



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# Making Your Link

How to get your PC communicating: building a bridge during rush hour.

The late humorist Robert Benchley professed to be totally mystified as to how one goes about building a bridge. Do you start on both sides of the river and hope to meet in the middle? Do you build the bridge entirely on land and then swing one end out over the water like a fishing rod? To Benchley's nontechnical mind the process seemed unfathomable. Although he did not survive into the age of the IBM Personal Computer, he might well have experienced that old, sinking feeling had he ever contemplated asynchronous communications for the PC. ("Asynchronous" describes the most common approach used to link computers and terminals over phone lines for occasional exchanges of data, and refers to the lack of any requirement that the data be sent within a strict timing rhythm.)

Complaints about communication on the PC have been abundant since its introduction. Many users have reported that the IBM-supplied software is unwieldy and difficult to use despite the clear and exhaustive documentation that accompanies it. Some users haven't even been able to get as far as cursing the software—they can't get the communications card to send signals to the outside world at all.

Peace. There isn't anything wrong with the hardware. And if IBM's software doesn't suit you, new communications packages—some supplied by amateurs and some by pros—are appearing almost weekly. This particular bridge, the communications link, is being built while traffic is already rolling over it, which would have been a new one on Benchley.

## The Hardware Question

PC has learned that in some cases the asynchronous communications card will not transmit signals properly to remote devices, thus making all questions of software adequacy moot. We learned this by installing a card into one of our own PCs and trying to communicate. No dice.

The problem, as it turned out, was not with the card but with the cable. And there was really nothing wrong with the cable



either; it was a perfectly legitimate 25-pin "RS232" connection with no opens, shorts, or other defects. So what did go wrong?

Benchley would really appreciate the answer. It seems that while RS232 is in theory an industry-sanctified standard for electrical connection, with each pin assigned a specific function, in practice there are one . . . two . . . many RS232s.

"There is no such thing as a standard," says Les Fried of Atlanta's Microstuff. "There is no Santa Claus either."

Some manufacturers have taken liberties with the RS232 specs to fit their own needs. So when we have a situation of IBM making the computer, a second company supplying a modem, and a third providing the cable, the potential for confusion multiplies.

This is especially true for the PC, since IBM has implemented RS232 to its fullest extent. "The card is fairly smart," explains David J. Stang of Starware, Washington, D.C. "It wants to send a lot of information on baud rates, start/stop bit options, and so forth. The cables may all look alike, but if any of the pins are crossed or merged, you may have a problem." There's a fair chance, Stang added, that cables bought at a personal computer store won't work.

"It's not the end of the world," says

Stang. "You can fix the cable yourself or get someone to do it for you." But if fixing a cable is a close enough approximation of the "end of the world" for you, Stang himself has produced and is selling a workable cable for the PC; so you might consider buying one of his.

## Communications Software Choices

The difficulties with IBM's communications software also stem from the elaborate nature of PC communications. Users have to define a lot of details about the communications link—full or half duplex, word length, etc.—and many of them aren't technically skilled enough to feel comfortable doing it.

The IBM package works best with another PC or with one of IBM's model 370 mainframe computers. For communications with networks, or CP/M-based systems, you might want to check out one of the other packages. They're available at every price from a straight giveaway to \$150.

Microstuff produces a top-of-the-line package, called Crosstalk. It presents on-screen menus that allow the user not only to control parity, data word length, and the other parameters, but also to change them dynamically while on-line. Most impor-



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tant, Fried says. Crosstalk has a file transfer mode that is protocol-compatible with an earlier version for the CP/M operating system. Therefore, it can transfer any CP/M file to the PC. Command files won't run, but Microsoft Basic programs probably will "with a little hammering and sawing."

**MUCH  
free software is  
available on the  
Capitol PC Club's  
bulletin board.**

Fried says. Another commercially available program, PCModem, is also reviewed in this issue.

PC's own Andrew Fluegelman has also written a communications package, called PC-Tolk, which he will send you if you mail him a blank formatted disk and a postage-paid, self-addressed mailing container. The address is Freeware, The Headlands Press, P.O. Box 862, Tiburon, CA 94920. PC-Tolk works well with a DC Hayes Smartmodem, has built-in access programs for the CompuServe and Source networks, and will print out, on command, your screen contents during the communications process.

Freeware programs are not totally free; the users are requested but not required to send back a modest contribution. Whether or not they do, they are encouraged to copy the program and share it with others.

Much free software, including still another communications package, is available on Wes Merchant's IBMPCUG bulletin board, the communications organ of the Washington area Capitol PC Club (703/560-0979). Merchant says he first became aware of the problems with IBM's communications software when callers began using other personal computers to put messages about it on his bulletin board.

One user, Charles Brandon of Boulder, Colorado, sent him a free communications package, which Merchant makes available to all callers who can overcome the Catch-22 of receiving it via phone link.

So take your pick of communications packages and build your own bridge to the outside world. Even Benchley could probably do it.

/PC



# Three Communications Go-Togethers

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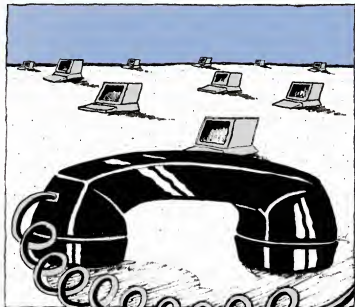
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Many products for microcomputers offer an array of appealing features. But in the not-yet-standardized micro world, the appeal often gives way to frustration when it proves difficult or impossible to exploit those tantalizing features with your particular system. Following is Richard Steck's report on a trio of products, each from a different company, that work together smoothly to deliver powerful communications capability to your PC. The featured product is the only one we know of that, when someone is calling you on the telephone, will print "RING, RING" on your display screen.

The Smartmodem from Hayes Microcomputer Products, Inc. is a highly innovative product designed to meet the need for flexible data communications. It is a compact, 1½-inch-high box that fits neatly under a standard telephone. There are switches and connectors on the rear and seven indicator lights on the front.

The rear panel contains a power switch, an RS-232C female plug for connection to a computer, a modular telephone jack, and a volume control for a built-in monitor speaker. The speaker on the bottom of the case lets you listen to the dialing process, ringing or busy signals, and the high-pitched tone sent by a distant computer when it answers. These features are particularly useful for hearing if there



is a problem or you have misdialed.

Two of the front panel's indicator lights tell you at a glance whether power to your modem is on and whether the serial interface card in your computer is ready. Two others flicker when your PC sends characters to the Smartmodem or when it receives characters over the phone line. The remaining ones tell you whether your phone is functionally "off hook," whether the Smartmodem detects the carrier (high-pitched tone) of the remote modem, and whether you have instructed the Smartmodem to answer your phone automatically.

Connecting the Smartmodem to the phone line is simple for modern phone equipment employing modular plugs and jacks (RJ-11 series). I recommend that you consider an adapter that permits a telephone and the modem to be connected simultaneously to one modular jack. (Attachment of any equipment to the phone

lines requires notification and approval of the telephone company. Instructions for such notification are simple and are supplied in the Smartmodem manual.)

To connect a Smartmodem to the Asynchronous Communications Interface of your PC, you will need a special cable. The cable has the familiar RS-232C connectors at each end—one male and one female. You can build your own cable using only three of the 25 pins and supplying the appropriate jumpers to supply certain control signals to the interface. Or you can get a cable that uses, at a minimum, pins 2, 3, 4, 5, 6, 7, 8 and 20. Suitable cables are available from many sources. One is Starware, whose president, David Stang, has worked out a cable expressly for connecting the PC and the Smartmodem, which he sells for \$34.95.

Working with the Smartmodem can be an enjoyable crash course in data communications. Compared to using the earlier



acoustic coupler-type modem, you can tell the Smartmodem what you want it to do and then monitor, through the indicator lights and the built-in speaker, the process of establishing communications.

The Smartmodem has two operational states: the Command state and the Terminal state. In the Command state the Smartmodem is listening to your commands regarding its operation. In the Terminal state

**ALTHOUGH  
the Smartmodem  
commands are easy to  
memorize, you can't  
beat menu-driven  
single-keystroke  
operation, and the  
PC's function keys  
seem natural for this  
purpose.**

characters are passed through the Smartmodem onto the phone line. Once in the Terminal state, the Smartmodem does not listen for your commands unless you send a special "escape" sequence of characters. You can flip the Smartmodem into Command state from Terminal state by typing `+++` from your keyboard. If you don't like this escape sequence, you can change it.

It would be impossible to cover all the features and commands of the Smartmodem in this brief article. Suffice it to say that the Smartmodem is based on the Z-80 microprocessor chip and a 2,000-character built-in control program. A command to the Smartmodem typically consists of several uppercase characters or numbers followed by a carriage return.

You can use the Smartmodem in its simplest form by typing:

**AT 0 5551212 cr**

This would dial the number 555-1212 and connect you to the remote computer if it answered. The **A**T is an attention code that precedes every command. The **D** asks the Smartmodem to dial the number that follows. If you reach the remote modem, the

Smartmodem will display "CONNECT" on your screen. If you do not, it will display "NO CARRIER." (If you think of it, you've accomplished a rather interesting feat at this point. Your microprocessor-controlled keyboard is talking to the system-board microprocessor, which is controlling the Asynchronous Communications Adapter microprocessor chip, which is controlling the microprocessor chip in the Smartmodem. You can only imagine how many more microprocessors lie between your keystrokes and the characters echoed to your screen by the remote computer.)

You can issue very complex commands to the Smartmodem. An example in the owner's manual is:

**AT M2 F0 Y1 0T 555-1212; S2=1 0 cr**

This command would keep the monitor speaker on continuously, set the modem to half-duplex, send plain English Smartmodem command acknowledgments to your CRT, dial 555-1212 using tone-dialing, change the Smartmodem wake-up character from `+++` to `AAA`, and put the Smartmodem on-line to await a carrier.

So much for commands—you get the idea. The repertoire of about 20 Smartmodem commands and the functions of the registers are explained in the Smartmodem owner's manual along with many examples.

Hayes Microcomputer Products says that the Smartmodem works up to 300 baud. This is conservative because users have been known to use the Smartmodem at 450 and 600 baud. I would suspect that the manufacturer has understated its capabilities. The Smartmodem was preceded at Hayes by its original offering, a modem board for S-100 microcomputers, and then by the very popular MICRO-MODEM II for the Apple. A considerable amount of thought and experience must have gone into the design of the Smartmodem.

You can operate the Smartmodem with a relatively simple BASIC program running on the PC. Examples are given in Appendix F of the IBM PC BASIC manual and on the PC-DOS diskette (COMM.BAS). However, using the PC and the Smartmodem without good software will not permit you to take full advantage of either. The examples mentioned above do not permit you to capture or send files. Although the Smartmodem commands are easy to memorize, you can't beat menu-driven single-keystroke operation, and the

PC's function keys seem natural for this purpose.

You would not expect one of the first telecommunications programs available for the IBM PC to be quite so good, but anything that follows System Software Service's PCMODEM program will have to work quite hard to improve upon it.

PCMODEM, a telecommunications program written by Gene Plantz of System Software Services, is a telecommunications program written primarily for the IBM PC used with the D.C. Hayes Smartmodem. Having used a number of other modem programs, I realized very quickly that all the elements needed for comfortable telecommunications on the PC were available in this program.

IBM's offering, Asynchronous Communications Support Software, works satisfactorily when communicating with IBM mainframes or with another PC, but it is quite disappointing when one learns that to use it with non-IBM equipment, it must be modified. [The code is not particularly easy to follow or change.] Add to this the lack of a stored phone number list, the lack of autodial, and an unfriendly user protocol, and you soon lay the package aside and look for other alternatives.

**I  
IN THE  
COMMAND state the  
Smartmodem is  
listening to your  
commands regarding  
its operation.**

For those of you who have used CLINK, ASCII Express, Visiterm, or Z-Term, I would describe PCMODEM as having the best of their features with benefits added to complement the features of the PC. For example, the KEY feature is used to continuously display a menu of options available to the user. Since PCMODEM runs under BASIC, the user can select features by pressing function keys.

Not much effort is required to install the PCMODEM: 64K of memory, a Hayes Smartmodem, an 80-column display, PC-DOS, and BASICA. Customization is pos-



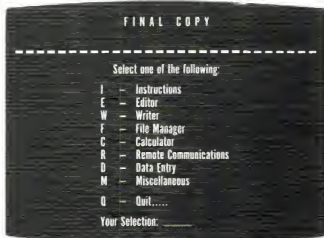
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sible not only within the guidelines suggested by the author but, since the program is written entirely in BASIC, it is quite easy to customize to particular needs. PCMODEM is written in as structured a manner as BASIC will permit. Program modules are easily identifiable and program logic flow is easy to understand.

## **I** **N THE** **TERMINAL state** **characters are passed** **through the** **Smartmodem on the** **phone line.**

A session begins by typing PCMODEM, which calls in BASICA and the PC-MODEM program with the appropriate buffer allocations. At this point, a menu is presented that offers these options:

- Turn Modem Online/Offline
- Switch Between 300, 450, 600 Baud
- Auto-Redial Last Phone Number
- Auto-Dial Phone Number From Menu or Manually
- Display Menu
- Turn Printer On/Off
- Write to Disk from Modem
- Write to Modem from Disk
- Hang Up Modem
- Quit Program
- Switch Between Half and Full Duplex
- Switch Between Touch-Tone and Pulse Dial
- Switch Auto-Answer On/Off
- Change Parity and Number of Data Bits

Having seen this menu, it is difficult to imagine any other features one might need. Each of the above features is accessible through the PC's function keys or through other single keystrokes. For example, depressing function key F4 permits dialing from a stored phone number list or from a phone number entered from the keyboard. If there is no answer, the number may be redialed repeatedly by depressing key F3. The auto-redialing may be stopped by again depressing F3.

PCMODEM is entirely menu-driven and I must admit that I succumbed to my usual practice of running the program first

and reading the instructions later (with user-friendly programs this never seems to be a problem). The instruction manual served only to confirm that I was using the program properly.

An important characteristic of any microcomputer communications program is the ability to capture and send files from and to remote computers. These functions are easily accomplished with PC-MODEM. A file is captured by depressing F7. You are then asked the name of the destination file and that file is opened. Large data-file captures are possible and are limited only by the space available on your diskette. F8 sends files in a similar manner. The communications protocol popular with bulletin boards and many time-sharing services, called XON-XOFF, works with PCMODEM. It seems that BASIC does a certain amount of internal bookkeeping that periodically slows it down. PCMODEM issues an "XOFF" to deactivate the remote computer during such internal processes and later an "XON" to activate the remote computer. I have neither lost data nor introduced ex-

traneous characters during some rather lengthy data transfers.

At this time there is no provision in PCMODEM for block transfers via Christensen protocol (the familiar XMODEM programs found on CP/M bulletin boards). The author indicated that this may be available in the near future. Other enhancements may include the use of assembler language modules to permit faster program execution in areas where that might be needed. I do not see either as being necessary for successful use of the program at this time.

PCMODEM has significantly expanded the horizons of my PC. Its ease of use has taken me beyond the facilities I had with previous microcomputer systems, and its author has been helpful whenever minor clarifications of program usage were required. PCMODEM is available from System Software Services for \$50, and it is well worth the money.

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# Using Data Files

Ways to store collections of information in disk files with BASIC—Part One: Sequential Access.

A data base is a collection of information organized to help you extract and work with elements of your choice. The IBM Personal Computer's BASIC language includes relatively uncomplicated tools for writing programs that create and use data bases stored on disk. This article is the first in a two-part series offering tips on how to incorporate easily used data files in your programs.

Part one of this series describes and gives examples of an access technique known as the sequential access method, which is a straightforward method of storing pieces of data sequentially (one after another as they arrive in the file). Part two will cover another technique known as the random access method, which provides faster access and more economical use of storage space. These articles do not teach BASIC programming—you must be familiar with the BASIC programming language on the PC to understand the examples of these techniques.

A data base, no matter how big (the Library of Congress) or how small (a 50-name mailing list) has a certain predetermined organization based on how you would want to find something. When you design your own data base, you must first plan its organization according to the ways in which you will access the data.

If your data base is a mailing list of newsletter subscribers, for example, would you want to mail newsletters to specific people on your list (find them by name), or would you want to mail newsletters according to their destinations (sort them by zip code)? If you wanted to do both, you would organize your data base records so that both the names and zip codes are easy to retrieve. You would then use the BASIC access techniques that make it easy to retrieve data in this manner.

There are many factors to consider:

- The information: How should information be organized for access? How will users access the data? How will other programs (if any) access the data? Should

there be some verification of the information to see if each piece of data conforms to some regulation.

- The "human interface": How will the program accept information from the outside world, and how will it report errors to users (errors in the information, in the typing or other input procedures, etc.)?

- Memory and storage space: How much disk storage will you need for the files (including room for expansion) and for "backup" copies of the files (for archives)? How much of the system's active internal memory is needed for "open" files while inputting or updating information, and how much of this active memory

**SEQUENTIAL**  
access usually means  
you are processing the  
information in a  
stream from  
beginning to end of  
the file.

is also needed for your program?

Advanced BASIC programmers looking for specific examples should skip ahead to the "Sequential Access Example: Recording Transactions." Newcomers to BASIC programming or to data base access methods read on.

First you should become familiar with the terms used in this article: input data is the information as it is typed, entered, or recorded in the data base; output is the information retrieved from the data base (usually in a readable form, on the screen or in a printed report); and input/output or I/O routines are BASIC statements that let you store pieces of data in a file and retrieve data from a file.

A data structure describes the form of each piece of data. A simple data structure

is the integer format in which each piece of data must be an integer. Another simple data structure is a string—a series of one or more characters (letters, digits, punctuation symbols, spaces, etc.) coded in ASCII format.

## BASIC Statements for Sequential Access

The BASIC statements INPUT#, LINE INPUT#, and PRINT# offer simple ways to get data into and out of a sequentially organized data base.

You can use these statements to access files that are organized sequentially (or even nonsequential files in order to process the information sequentially). Sequential access to the file usually means that you are processing the information in a stream, as it is stored from the beginning to the end of the file, and that you are processing all of the data in the file from beginning to end.

Sequential access to the information may sound slow, but if the file is small enough, you can retrieve ("read") the entire file sequentially into your computer's internal memory, where your program can process random pieces of the file using any number of data access methods.

A file could contain, for example, the inventory data of a truck rental business of 50 trucks. This inventory data-base file could be organized so that each record holds the information for each vehicle: reservations, maintenance schedule, invoices, etc. Your program could sequentially "read" the entire file from disk into the computer's memory, where it could then update records randomly.

Since the entire file describes only 50 trucks, it would probably all fit in the Personal Computer's user memory. A larger file, describing a rental business that has more equipment, would have to be organized so random access can be gained directly from the disk instead of transferring the whole file to memory. (Part two of this series will deal with the latter case.)

Some data base applications are naturally suited for both sequentially orga-



nized files and sequential access. For example, if you wanted your program to "massage" (process or manipulate) data before sending it to a text processor, or before printing the data, you would use sequential access techniques in the program. Other sequential access applications include the posting of cash receipts or transactions, and the processing of scientific and statistical data in "batch" mode (in large packets that follow each other sequentially).

There is one characteristic of BASIC sequential access statements that every BASIC programmer should know: the in-

## **T**HERE IS one characteristic of sequential access statements that every BASIC programmer should know.

formation stored with PRINT#, or retrieved with INPUT# or LINE INPUT#, is treated as a string of characters. As a result, numeric information takes up more space than if it were stored in the binary format the computer usually uses. For example, the integer 12345 requires only two cells of memory space if stored as an integer; the same number, stored as a series of digit characters, occupies seven cells. The character format (sometimes called ASCII format) must be used for all data—words, letters, digits, spaces, punctuation symbols, etc.

Although the assembly language programmer could implement a faster method of access, the BASIC programmer has the advantage of not having to be concerned with the actual mechanics of "disk I/O" (input/output techniques that handle transfer of data to and from the disk drives and the computer's input/output buffer). Disk BASIC statements, like PRINT#, INPUT#, and LINE INPUT# handle the "disk I/O" routines for you, and they manage the input/output buffer. Your BASIC program interacts with the buffer, a temporary storage place for data on its way somewhere else, using BASIC input/output statements.

In sequential access, you need not con-

## Recording Transactions: An example program

This example records OTC (Over-The-Counter) stock prices and allows records in the file to be added, updated, or deleted. Since the file is sequentially organized, information must be read from beginning to end and rewritten with updated information.

The access technique in this example accumulates all new information into a transaction file (TRANS.DAT) and then merges the transaction file with the "source" file (STOCKS.DAT—the file containing original records from previous transactions). This merging operation actually takes the entire information [old and new information merged together], writes it to a temporary file (TEMP.DAT), and then copies the temporary file's contents into a new "source" file. The temporary file and the transaction file are then deleted, leaving an updated "source" file (STOCKS.DAT).

Statement 140 in the program writes the stock name (a string), and the current bid and asked prices (two numbers), I use a literal comma (",") as a string delimiter (following INCOMPS). The numbers are naturally separated by a trailing space after each number. I use semicolons to prevent extra leading spaces (to save space in both the buffer and the disk file).

Remember, the PRINT# statements as used here do not allow stock names to contain commas. To allow commas in the stock name, you would have to surround the INCOMPS function with "CHRS(34)" to surround the name with double-quotes (e.g., PRINT #3, CHRS(34); INCOMPS; CHRS

[34]...in lines 140, 250, 400, and elsewhere).

One convenient aspect of BASIC sequential access statements is that it doesn't matter if you use one PRINT# statement to store the data, or multiple PRINT# statements. For example, the loop at statement 490 could have been written differently, as follows:

```
490 FOR I = 1 TO 30 STEP 2:
    PRINT #2,B(I):A(I):B(I+1):A(I+1):
NEXT I
```

You may have noticed the variables SN and TN, and wondered about their uses. When there is no more data in either the "source" file or the transaction file, there may be data already read from the other input file, but not yet written to TEMP. To detect this problem the logical variables SN (for "source") and TN (for "transaction") are manipulated and tested to determine whether the data should be written to TEMP.DAT before the file is copied.

The techniques used in this program are typical of techniques used to handle sequentially organized files. If the data in the TEMP.DAT or TRANS.DAT files have archival value (and you want to keep copies), or if you want to add a recovery procedure to retain and store this data, you can delete the copy-back step of the program beginning with line 580, and rename the TEMP.DAT and TRANS.DAT files. Be sure to delete lines 780 and 790 if you want to save TEMP.DAT and TRANS.DAT.

```
1 REM
2 REM SEQUENTIAL ACCESS METHOD EXAMPLE
3 REM MODIFY A FILE WITH CURRENT TRANSACTIONS
4 REM
5 REM
6 REM
10 CLEAR 100
20 DEFINT I=0DIM B10(30),ASKED(30),B130,A(30)
30 FALSE = 0:TRUE = -1
40 OPEN "I",1,"B:STOCKS.DAT"
50 OPEN "O",3,"B:TRANS.DAT"
60 OPEN "O",2,"B:TEMP.DAT"
70 IC# = "INCOMPS"
80 WHILE INCOMPS <> "QUIT"
90 CLS:INPUT"ENTER COMPANY NAME":INCOMPS
100 IF INCOMPS = IC# THEN
    PRINT "NAME OUT OF SEQUENCE - TRY AGAIN!"
    FOR I = 1 TO 1000:NEXT I
    GOTO 90
110 IC# = INCOMPS
120 INPUT"ENTER BID PRICE":B(1)
130 INPUT"ENTER ASKED PRICE":A(1)
140 PRINT #2,INCOMPS;"",B(1);A(1): 'WRITE TRANSACTION FILE
150 WEND
160 CLOSE 3
170 OPEN "I",3,"B:TRANS.DAT"
180 IF EOF(3) THEN 300
190 TN = FALSE:GOSUB 250
200 SN = FALSE:GOSUB 380
```

\*SOURCE EMPTY

\*READ A TRANS RECORD

\*READ A SOURCE RECORD

(Continued on page 95)



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cern yourself with the buffer and with disk input/output—the BASIC statements simply “read” the next data item in sequence, or “write” the next data item in sequence. With the random access techniques described in Part two, you have to exercise more control over the buffer activities and other disk input/output mechanisms.

The BASIC sequential access statements give you flexibility in the organization of your data—they allow you to store data in any sequential order you choose. Several statements can be condensed and still perform the same function (the statement “PRINT#1,A;B;C;” performs the same function as the statements “PRINT #1,A;PRINT#1,B;PRINT#1,C;”).

It is up to the programmer to be careful that the program stores data in the same format expected for retrieval. Since all data in sequential access is stored as character strings, you must retrieve them as character strings (unless you are doing something extraordinary and paying careful attention to the results).

BASIC can only separate one character from another if there is a delimiter be-

tween them—in our examples, we use a comma as a string delimiter. Numbers (sets of ASCII digits) do not need explicit delimiters between them—a space suffices as a delimiter between numbers.

## SEVERAL statements can be condensed and still perform the same function.

If you neglect to put a comma between two strings or between a string of characters and a string of digits, you may get errors while trying to retrieve correctly stored data. To illustrate this point, consider the following example:

```
10 A = 12.32
20 B$ = "A YELLOW BASKET CASE"
30 PRINT #1,B$; " " ; A;
```

After executing the above statements, the data stored on disk is organized sequentially like this:

"A YELLOW BASKET CASE 12.32"

In another program, you could use the following BASIC statement to retrieve the data in the above example:

```
INPUT #1,B$.A
```

However, you would get the following data in B\$, and an "Input Past End" error for the variable A:

"A YELLOW BASKET CASE 12.32"

If, on the other hand, you had used a literal comma as a string delimiter between "A YELLOW BASKET CASE" and "12.32" in the PRINT# statement above, you would have correctly retrieved "A YELLOW BASKET CASE" in B\$ and "12.32" in the variable A. The PRINT# statement with the literal comma used as a string delimiter looks like this:

```
30 PRINT #1,B$; ", " ; A;
```

Following are hints for using PRINT# to store data in a sequential format:

1. Separate each data item with a semi-

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(Continued from page 92)

```

210 IF INCORP# > COMPANY# THEN
    GOSUB 440: 'WRITE SOURCE DATA
    SN = FALSE:GOSUB 360: 'READ SOURCE FILE
    GOTO 180
220 IF INCORP# < COMPANY# THEN
    GOSUB 480: 'WRITE TRANS DATA
    TN = FALSE:GOSUB 250: 'READ TRANS FILE
    GOTO 180
230 IF INCORP# = COMPANY# THEN
    GOSUB 520: 'MODIFY DATA
    TN = FALSE:GOSUB 250: 'READ TRANS FILE
    SN = FALSE:GOSUB 360: 'READ SOURCE FILE
    GOTO 180
240 GOTO 210 'CONTINUE UNTIL BOTH SOURCE & TRANS EMPTY
250 IF NOT(EOF(3)) THEN
    INPUT #3, INCORP#, B(1), A(1): 'READ RECORD FROM TRANS
    TN = TRUE:
    RETURN
260 REM 'END OF FILE ON TRANS FILE - COPY SOURCE FILE
270 IF SN THEN GOSUB 440: 'WRITE SOURCE DATA
280 IF EOF(1) THEN 570: 'EVERYTHING WRITTEN TO TEMP
290 INPUT #1, COMPANY#
300 PRINT #2, COMPANY#: ", "
310 FOR I = 1 TO 30: 'READ STRING
320 INPUT #1, B(1), A(1): 'READ PAIR OF NUMBERS
330 PRINT #2, B(1), A(1): 'WRITE PAIR OF NUMBERS
340 NEXT I
350 GOTO 280
360 IF NOT(EOF(1)) THEN
    INPUT #1, COMPANY#
    FOR I = 1 TO 30: 'READ SOURCE STRING
    INPUT #1, B(1), A(1): 'READ PAIR OF NUMBERS
    NEXT I
    SN = TRUE:
    RETURN
370 REM 'THERE WAS AN EOF ON SOURCE - COPY TRANS TO TEMP
380 IF TN THEN GOSUB 480
390 IF EOF(3) THEN 570
400 INPUT #3, INCORP#, B(1), A(1): 'READ TRANS RECORD
410 PRINT #2, INCORP#, ", "
420 FOR I = 1 TO 30: 'WRITE 30 ELEMENT ARRAYS
    PRINT #2, A(1), B(1)
NEXT I
430 GOTO 390
440 PRINT #2, COMPANY#, ", "
450 FOR I = 1 TO 30:
    PRINT #2, B(1), A(1)
NEXT I
460 RETURN
470 REM 'WRITE TRANS DATA TO TEMP
480 PRINT #2, INCORP#, ", "
490 FOR I = 1 TO 30:
    PRINT #2, B(1), A(1)
NEXT I
500 RETURN
510 REM 'MODIFY THE SOURCE DATA AND WRITE IT TO TEMP
520 IF EOF(1) AND EOF(3) THEN 570
530 PRINT #2, INCORP#, ", "
540 PRINT #2, B(1), A(1)
550 FOR I = 1 TO 29:
    PRINT #2, B(1), A(1)
NEXT I
560 RETURN
570 CLOSE
580 OPEN "I", 2, "B:TEMP.DAT"
590 OPEN "O", 1, "B:STOCKS.DAT"
600 INPUT "DO YOU WANT TO REVIEW THE DATA?"; R$
610 IF EOF(2) THEN 770
620 INPUT #2, COMPANY#
630 IF R$ < "Y" THEN 660
640 CLS:PRINT#3, COMPANY#
650 PRINT
TAB(1) = "BID":TAB(2) = "ASKED":TAB(3) = "BID":TAB(4) = "ASKED":TAB(5) = "BID":TAB(6) = "ASKED"
660 FOR I = 1 TO 30:
    INPUT #2, B(1), A(1)
NEXT I
670 IF R$ < "Y" THEN 730
680 FOR I = 1 TO 30 STEP 3:
    PRINT
    TAB(1) = B(1):TAB(2) = A(1):TAB(3) = B(1):TAB(4) = A(1):TAB(5) = B(1):TAB(6) = A(1)
690 NEXT I
700 OS = ""
710 INPUT "DO YOU WANT TO DELETE THIS ISSUE?"; D$
720 IF D$ < "Y" THEN 610
730 FOR I = 1 TO 1000:
    PRINT #1, COMPANY#
740 FOR I = 1 TO 30:
    PRINT #1, B(1), A(1)
NEXT I
750 GOTO 610
760 CLOSE
770 KILL "B:TEMP.DAT"
780 KILL "B:TRANS.DAT"
800 END

```

colon. Since BASIC "prints" to a disk file in the same manner that it "prints" to the screen, the semicolon eliminates extra spaces between data items and saves disk space.

2. Unlike numbers (sets of number characters) that are stored with one trailing space to separate one number from the next, strings (mixed sets of letters, numbers, punctuation, etc.) must have an explicit delimiter between them—usually a comma. To place a comma in the data stream between two strings, surround the comma with quotation marks in the PRINT# statement as shown below:

```
30 PRINT #1, A:B:C$; ", "; D$; ", ";
```

This statement places a literal comma between C\$ and D\$, and a comma following D\$.

3. If you want to store a string that contains a comma (not being used as a delimi-

## THE statements INPUT# and PRINT# offer simple ways to get data into and out of a sequential data base.

ter), you must enclose the entire string in double-quotes. The CHR\$(34) function provides the double-quotes in the following example, which stores the entire string "A TISKET, A TASKET" as one string with no delimiter:

```
10 AS = "A TISKET, A TASKET"
20 PRINT #1, CHR$(34); AS; CHR$(34);
```

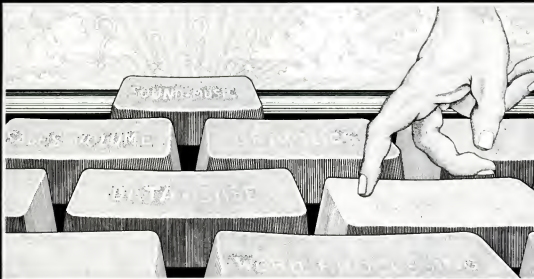
Were it not for the double-quotes stored on disk with the string, only "A TISKET" would be retrieved with the statement "INPUT #1, AS"; with the double-quotes, the entire string "A TISKET, A TASKET" is retrieved with the statement "INPUT #1, AS".

An example program follows that illustrates uses of PC-BASIC's sequential access statements. */RC*

B. Boosso is a computer programmer and author in Newbury Park, California. Tony Bove and Cheryl Rhodes also assisted in the preparation of this article.



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# Easy-As-Pie Charts

*Beyond the straight line—using PC BASIC's graphics power for easy circles and solid colors.*

**S**traight lines seem to pervade typical computer graphics. That's because it is usually easy to plot points, draw lines, and construct boxes using graphics commands found in microcomputer versions of the BASIC language. The IBM Personal Computer's Advanced BASIC lets you transcend lines and boxes using one simple command—CIRCLE. It is not difficult to draw circles in BASIC without a special command, but it is tedious. On the PC, the CIRCLE command makes drawing circles, arcs, and ellipses fast and easy.

Another Advanced BASIC command, PAINT, works especially well with CIRCLE. It fills areas of the screen with solid colors, making it as easy to create discs as it is to create hollow circles.

There are many practical uses of the CIRCLE and PAINT commands. For example, a simple program will plot points and connect the points to form a line graph (Figure 1), but drawing a solid circle at each plotted point enhances the line graph considerably (Figure 2). Circles also depict proportions well. If a circle of one size represents, say, 100, a circle twice as large will visually represent 200, and a circle half as large will represent 50. Figure 3 illustrates a more complex distribution of this type. Of course, the classic way to depict proportional shares of a whole is with a pie chart, which certainly relies on circle-drawing capability (Figure 4). Three demonstration programs (see box) illustrate these uses of circles in graphics.

This article explores the CIRCLE and PAINT commands in practical applications. This is an advanced topic and requires a general understanding of PC BASIC and specific knowledge of PC BASIC graphics capabilities and techniques.

## The CIRCLE Command

What are the PC's requirements for circle drawing? First, the computer must be ready to understand the CIRCLE command. That means Advanced BASIC must be in control and the display screen must be in one of the graphics modes. The state-



Figure 1: A plain line graph.



Figure 2: Line graph enhanced with CIRCLE and PAINT.

ment SCREEN 1 selects medium-resolution graphics, and the statement SCREEN 2 selects high-resolution graphics.

Before Advanced BASIC can draw a circle, it needs to know where the circle will go on the display screen, how big to

make the circle, and what color the circle should be. Finally, since CIRCLE is a general command that draws partial or whole circles, BASIC needs to know which part of the circle to draw.

Following is a sample statement that



draws a circle in the middle of a medium-resolution screen:

**CIRCLE (160,100),50,1,0,6,2831**

The first two numbers specify the coordinates of the center of the circle, namely column 160 and row 100. The third number, 50, determines the size of the circle. The fourth number tells which color to draw in. The last two numbers specify which part of the circle to draw. The statement above draws the whole circle.

The **CIRCLE** command specifies the center of the circle with standard column and row numbers. Row numbers range from 0 at the top of the screen to 199 at the bottom. Column numbers start with 0 at the left edge of the screen and end at the right edge with 319 in medium resolution

and 639 in high resolution. Circle size is measured in the same units as columns. Radius determines circle size, and one unit of radius equals the width of one column. Therefore a circle with a radius of 6 has a diameter of 12 columns. Of course columns and rows are not the same size, nor is the screen square—it is wider than it is tall. The **CIRCLE** command compensates automatically for these facts. In medium resolution, six columns equal five rows. This means a medium-resolution circle with a diameter of 12 columns also has a diameter of 10 rows. In high resolution, 12 columns equal 5 rows.

The color specification in a **CIRCLE** command is optional. The following high-resolution example shows the fourth num-

ber missing:

**CIRCLE (160,100),100, .0,6,2831**

Notice that the comma for the color specification remains. When the color specification is absent, BASIC draws a circle in the standard foreground color. That is color number 3 in medium resolution, which is white or brown, depending on the active foreground palette. In high resolution, color number 1, white, is the default.

Choices for medium-resolution colors include color numbers 0, 1, 2, and 3. Color numbers 1, 2, and 3 choose a color from the active-foreground palette. Color number 0 is the background color; it is useful for erasing. For example, the following program draws two circles—one cyan and one white—and then waits for someone to



Figure 3: Using circles to depict proportions.

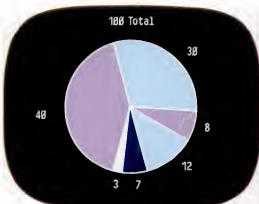


Figure 4: A pie chart.



Figure 5a: The 360 degrees in every circle.

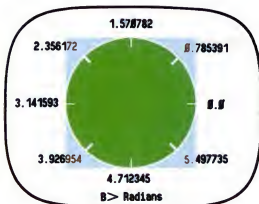
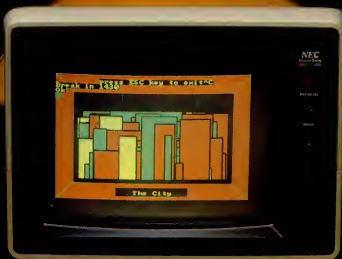


Figure 5b: Circle divided into radians instead of degrees.



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press any key on the keyboard. When that happens, the program erases the white circle by drawing over it with the background color.

```
10 SCREEN 1: REM Set med. res. graphics
20 CLS: REM Clear screen
30 CIRCLE (200,120),25,1,0,6,2831:
   REM magenta
40 CIRCLE (110,140),25,.0,6,2831:
   REM white
50 AS=INPUT$(1): REM Wait for keystroke
60 CIRCLE (110,140),25,0,0,6,2831:
   REM background
```

In high resolution, an odd color number draws a white circle, and an even color number draws a circle in the background color.

### Drawing Arcs

The CIRCLE command can also draw part of a circle. How does BASIC know which arc to draw? The answer relies on a convention of geometry that says every complete circle contains 360 degrees. Think of a compass; it has 360 degrees. Geometry does not number the degrees of a circle the same as a compass, however. It

starts with 0 on the right and proceeds counterclockwise, with 90 degrees straight up, 180 degrees at the left, 270 degrees straight down, and back around to 360 degrees at the right (Figure 5a). To further complicate matters, PC BASIC measures circles not in degrees, but in radians (Figure 5b). Radians relate to the mathematical constant  $\pi$ , which is about 3.14159. One half-circle, 180 degrees, is the same as  $\pi$  radians. A full circle is 360 degrees or  $2\pi$  (about 6.2831 radians). To convert from degrees to radians, multiply by 0.0174532.

To specify an arc, state the point on the circle at which it starts and the point at which it ends. State both points in radians. So far, examples of the CIRCLE command specified the arc starting at 0 and ending at 6.2831 radians, in other words, the whole circle. The following statement specifies just half a circle:

```
CIRCLE (160,100),50,1,0,3,1416
```

One ambiguity remains: The two points that specify an arc actually specify two arcs. Draw counterclockwise from the start point and one arc appears, draw

*(Continued)*

## Circles and Solids: Three Sample Programs.

### Enhanced Line Graph Program

The Enhanced Line Graph Program plots 12 points, emphasizes the points by drawing solid circles over them, and connects the points to form a line graph. Figure 2 illustrates program output. The program calculates equidistant column coordinates and reads corresponding row coordinates from DATA statements.

The program begins by turning off the standard bottom-line display of soft-key uses, setting medium-resolution graphics mode, and clearing the display screen (lines 10-30). Next, it computes the current column number (line 40) and reads the current row number from the DATA statements' list of values (line 50). Then the program draws the next segment of the graph (line 60). Variable LC determines the line color. Its initial value is 0, so the first line is in the background color. Next, the program enhances the point with a circle (line 70) and fills in the circle with color (line 80). The value assigned to variable LC on line 100 determines the color of the next line segment. Lines 120 and 130 establish the list of DATA statements' values for the row number of each point.

### Proportional Circles Program

The Proportional Circles program will divide a whole amount into as many as six parts and display a proportionally sized circle for each part. Figure 3 shows program output when inputs are 30, 40, 3, 7, 12, and 8. The program is fairly unsophisticated, so it will not work for all input combinations.

The first part of the program (lines 10-40) performs housekeeping chores. Lines 10 and 20 hold the column and row coordinates for each of the six circles that may be output: the first circle is at (85,80), the second is at (175,95), and so on. The first thing the program does is turn off the standard bottom-line display of soft-key uses (line 30). Next it clears the screen (line 40).

Lines 50 through 90 input data. The program user must enter the amounts to be apportioned (lines 50, 60, 70, and 90). Any amount can be 0. While this is going on, the program keeps a running total of amounts entered (line 80).

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After finishing the input, the program sets medium-resolution graphics mode (line 100), clears the screen (line 110), and displays a title at the top of the screen (lines 120 and 130).

Finally, the program draws the proportionally sized circles (lines 140 to 220). If any of the six amounts is 0, the program skips it (line 150). For non-zero amounts, the program gets circle coordinates from the data statements (line 160). Next, it computes the size of the circle according to the ratio of the partial amount to the total amount (line 170). Then, in a position near where it will display the circle, the program displays the partial amount (lines 180 and 190). After that, it draws a circle (line 200) and fills it with color (line 210). After displaying all circles, the program

screen (lines 20-40). Then the program inputs the number of wedges (lines 50 and 60). It inputs the size of each wedge (lines 70-110). During the input phase, the program keeps a running total of wedge sizes (line 100).

When input is finished, the program clears the display screen and displays a title (lines 120-140). It starts the first wedge at 0 radians (line 150) and sets the length of each wedge radius at 90 (line 160). Lines 170-250 display the wedges. For each wedge the program computes the endpoint and midpoint in radians (lines 180 and

190), then, near the midpoint, it displays the wedge size (lines 200 and 210). After that the program outlines the wedge (line 220). Negative start and end points in the CIRCLE statement draw the wedge radii, and subtracting .001 from the start point keeps it non-zero. Line 230 fills the wedge with color, starting near the wedge center. The next wedge starts where the current wedge ends (line 240). After displaying the pie chart, the program moves the cursor to the bottom of the screen (line 260) in anticipation of the Ok message at the end of the program.

## Pie Chart

```

30 DIM PART(25)
30 KEY OFF
20 SCREEN 1
40 CLS
50 PRINT "How many parts?"
60 INPUT N
70 FOR J=1 TO N
80 PRINT "Size of part":J
90 INPUT PART(J)
100 TOTAL=TOTAL+PART(J)
110 NEXT J
120 CLS
130 LOCATE 1,15
140 PRINT TOTAL;"Total"
150 STARTPT=0
160 RAD=90
170 FOR J=1 TO N
180 ENDPNT=6.283185*PART(J)/TOTAL+STARTPT
190 MIDPT=(STARTPT+ENDPT)/2
200 LOCATE (100-SIN(MIDPT)*(RAD-8))/8,(160+COS(MIDPT)*(RAD+16))/8
210 PRINT PART(J);
220 CIRCLE (160,100),RAD,3,-STARTPT-.001,-ENDPT
230 PAINT (160+COS(MIDPT)*RAD*.75,100-SIN(MIDPT)*RAD*.75),J MOD 4,3
240 STARTPT=ENDPT
250 NEXT J
260 LOCATE 22
270 END

```

# *I<sub>N</sub>*

*addition to drawing arcs, the CIRCLE command can draw a ray to either or both endpoints.*

moves the cursor to the bottom of the screen (line 230) in anticipation of the Ok message at the end of the program.

## Pie Chart Program

The Pie Chart program constructs a pie chart with any number of wedges. The program user must enter the number of wedges and the size of each wedge. Figure 4 shows program output for six wedges: 30, 40, 3, 7, 8, and 12. The program displays the wedge size near the center of the appropriate arc. As an exercise, try changing the program to input a label for each wedge of the pie, and print out the label instead of, or along with, the wedge size (see lines 190-210).

The program begins by performing several housekeeping chores. First, it allocates space for 25 wedges—the practical maximum (line 10). Next, the program turns off the standard bottom-line display of soft key uses, sets medium-resolution graphics mode, and clears the display

## Proportional Circles

```

10 DATA 85,60,175,95,245,35
20 DATA 60,150,165,170,260,145
30 KEY OFF
40 CLS
50 FOR J=1 TO 6
60 PRINT "Amount for part":J
70 INPUT PART(J)
80 TOTAL=TOTAL+PART(J)
90 NEXT J
100 SCREEN 1
110 CLS
120 LOCATE 1,15
130 PRINT TOTAL;"Total"
140 FOR J=1 TO 6
150 IF PART(J)=0 THEN GOTO 220
160 RAD=100
170 RAD=100*PART(J)/TOTAL
180 LOCATE (R+RAD)/8+2,(C-RAD)/8
190 PRINT PART(J);
200 CIRCLE (C,R),RAD,2,0,6.2831
210 PAINT (C,R),J,2
220 NEXT J
230 LOCATE 22
240 END

```

## Enhanced Line Graph

```

10 KEY OFF
20 SCREEN 1
30 CLS
40 FOR C=9 TO 319 STEP 26
50 READ R
60 LINE -(C,R),LC
70 CIRCLE (C,R),2,2,0,6.2831
80 PAINT (C,R),2,2
90 LC=1
100 NEXT C
110 END
120 DATA 140,120,110,100,100,100
130 DATA 90,100,80,50,100,70

```



clockwise and a different arc appears. To resolve the ambiguity, BASIC draws counterclockwise if the first arc endpoint is less

**A** *SOLID*  
circle drawn at each  
data point makes line  
graphs look much  
better.

than the second, but it draws clockwise if the first arc endpoint is greater than the second. Figure 6 shows some sample arcs.

#### Drawing Rays

In addition to drawing arcs, the CIRCLE command can draw a ray from the center of the arc to either arc endpoint. A negative endpoint in a CIRCLE statement generates a ray to that endpoint. The following example draws a ray from coordi-

Figure 6: Arcs.

nates [40,100] to the second arc endpoint:  
CIRCLE (40,100),30, .3,1416,-4.7124  
The minus sign does not affect the arc. However, the endpoint -0 is not allowed,

even though 0 is. To circumvent this limitation, use -0.001 instead of -0.

When both endpoints are negative, both rays are drawn, creating a pie-shape wedge. Here is an example:

CIRCLE (240,100),30,2,-3,1416,-4.7124

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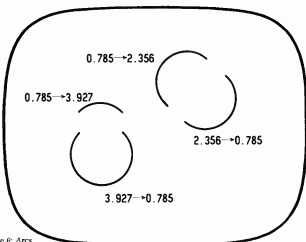
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#### Drawing Ellipses

The CIRCLE command can also draw ellipses. This requires one more piece of information, the aspect ratio—the relationship between the height and width of the ellipse drawn. Here is an example:

CIRCLE (270,100),50,1,0.6,2831,5/3

The extra number at the end of this statement specifies the aspect ratio. The easiest way to understand the aspect ratio is to think of it as a fraction with a separate

**P** *AIN*  
will not work right  
unless a single color  
completely surrounds  
the area to be filled.

numerator and denominator. The numerator tells how many rows equal the number of columns specified by the denominator. In medium resolution, an aspect of 5/6 yields a circle, an aspect of 1/3 (or 2/6)



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produces a short, wide ellipse, and an aspect of 5/3 (or 10/6) yields a tall, narrow ellipse (Figure 7). In high resolution, an aspect ratio of 5/12 yields a circle.

Decimal fractions make perfectly acceptable aspect ratios too. For example, the ratio 5/6 is the same as the decimal .8333333. It so happens that when the aspect ratio has a value less than 1, BASIC draws ellipses with the same width and varies the height (Figure 8a). On the other

hollow a circle out of it.

```
10 SCREEN 1: REM Set med. res. graphics
20 CLS: REM Clear screen
30 PAINT (1,1),1: REM Paint whole background
40 CIRCLE (50,150),20,0,0,6.2831: REM outline shape
50 PAINT (50,150),0,0: REM Paint circle
```

The PAINT and CIRCLE commands have electronic replacements for a chart-maker's toolbox filled with compasses,

protractors, rulers, brushes, palettes, erasers, and the like. It may take you some time to grow facile at their use, but once you do, you'll find them far swifter, simpler, and more reliable than the paper-and-pen tools they replace.

/PC

Copyright © 1982, Lon Poole.  
Poole is the author of several books on microcomputer programming, including *Some Common BASIC Programs*.

## **THE** **PAINT and CIRCLE** **commands are** **electronic** **replacements for** **compass, protractor,** **and a box full of** **similar tools.**

hand, when the aspect ratio is greater than 1, the height stays the same and the width varies (Figure 8b).

### **The PAINT Command**

PAINT is another graphics command included in the PC's Advanced BASIC. It fills in a selected area on the screen with one of the graphics mode colors. Here is an example:

```
PAINT (150,100),3,1
```

The statement tells the computer to start at point (150,100) and paint the screen color 1 in all directions, and not to stop painting in any direction until it encounters color 3. That means there must be some shape in foreground color 3 surrounding point (150,100).

The fill color can differ from the border color, but the entire area must be bordered by a single color. PAINT will not work correctly unless a single color completely surrounds the area to be filled. If there are gaps in the border color, the fill color will leak out and paint the rest of the screen. This feature of the PAINT command makes it possible to paint the entire background with a foreground color. The following statements paint the entire background area with foreground color 1, then



Figure 7: Ellipses in medium-resolution graphics.

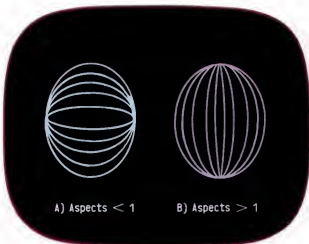


Figure 8: Ellipses.



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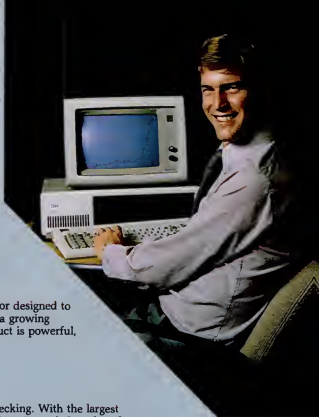


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# Bouncin' Along With PChallenge

A video game with color, sound, and fast action—all in 16 lines of BASIC.

In the early 1970s Nolan Bushnell developed a video game, Pong, that became an overnight success. The company that grew from Pong, Atari, Inc., made Bushnell a rich man. Today, the IBM Personal Computer's Advanced BASIC language makes it easy to write games with the same kind of fast action and sound effects plus color, which the original Pong didn't have.

Programming editor Karl Koessel demonstrates this point with PChallenge, the BASIC program that appears below. This Pong-like, one-player "video handball" game is all done with 16 lines of BASIC code, including scorekeeping. This code is admittedly packed more densely

than need be to illustrate how compactly it can be done with so few lines of code.

Following is Koessel's program along with excerpts from his explanation of it. You may find it instructive to figure out the rest for yourself, perhaps with help from BASIC's "trace" function (give the command TRON before running the program, and each line's number will appear on the screen as it is executed). If you get stumped, see the end of the article for how to get a complete copy of Koessel's explanation. PChallenge may not make you a millionaire like Bushnell, but it will enrich your knowledge of BASIC and provide you with more fun than a barrel of quarters.

&HB0000 for the monochrome monitor).

Line 14 initializes a couple of variables, builds the paddle (P\$), puts 10 balls on the top row, and POKEs the walls ("bricks" of character 219s) around the playing field ("empty" spaces of character 32s).

Line 2 is reached just after printing the ball in a new position. Here we wait a while. How long depends on the value of L, the drag factor. This wait determines the speed of the ball, values of 150 and greater making the speed slow enough for the very young.

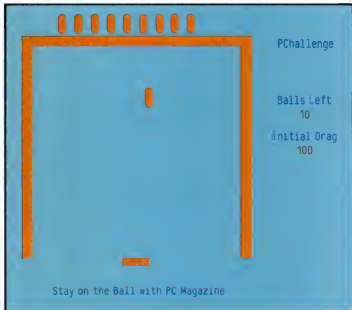
Line 5 plays the bouncing tone. The "MB" at the beginning of the PLAY statement's parameter string means Music Background and tells the computer not to wait for the speaker to finish but to keep computing while "singing." If the up/down bounce counter, M, is a multiple of 14 (i.e.  $M \text{ MOD } 14 = 0$ ), L, the drag factor, is

**P**Challenge is a ball and paddle game that uses the left- and right-arrow keys to move a paddle toward the bouncing ball. Although it works with a monochrome display, its full glory is revealed by a color display.

The program begins by skipping to Line 11, which sets the screen width to 80 columns; picks foreground, background, and border colors; clears the display; and turns off the softkeys' display at the bottom of the screen. Defining variables as single-byte "integer precision," when possible, shortens operating time and reduces required memory. Function P is defined to calculate the offset to the start of screen memory for a character at row V, column X of the screen. This function is used later both to check what character is in a particular position on the screen, and to place characters at a particular location. The speed requirement of the program demands working directly with the screen's memory instead of using other BASIC commands, such as LOCATE and PRINT, that would do the same job but more slowly.

Line 13 clears the screen, changes the foreground color, prints the title and other headings on the right side of the screen, gives us a bit of advice, and, after determining (with a pair of statements you may want to use in other programs) whether a

color or monochrome monitor is attached, then defines the start of the current segment of memory (for PEEK and POKE functions) to coincide with the start of screen memory (&HB0000 for color and





decreased by 10 percent and the ball speeds up.

Lines 6-8 contain the subroutines to move the paddle left or right. These are known as key-driven interrupt subroutines. As explained before, each ON KEY (n)—n is one of 14 keys; see your IBM BASIC Manual—statement points to a line to which the program is to GOSUB in response to pressing KEY(n).

code. I hope you have as much fun with PChallenge as I had putting it together.

For the full explanation...

To receive a copy of Karl Koessel's complete explanation of how the PChallenge program works, send a stamped, self-addressed, business-size envelope to: PChallenge, PC Magazine, 1528 Irving St., San Francisco, CA 94122./PC

All this in just 1½ screens of BASICA

```
1 GOTO 11
2 FOR T=1 TO L:NEXT:POKE FNP(X,V),32
3 X=X+A:V=V+B:IF V=1 THEN A=1-2*RDND ELSE IF V=23 THEN 9 ELSE IF PEEK(FNP(X,V))<>
219 THEN POKE FNP(X,V),2:GOTO 2
4 IF PEEK(FNP(X,V-B))=32 THEN B=-B:M=M+1 ELSE IF PEEK(FNP(X-A,V))=32 THEN A=-A
LSE A=-A:B=-B:M=M+1
5 PLAY"MC64":IF M MOD 14 THEN 3 ELSE L=L+.9:GOTO 3
6 KEY(12) OFF:KEY(13) OFF:IF D>1 THEN D=D-3:GOTO 8 ELSE 8
7 KEY(12) OFF:KEY(13) OFF:IF D<51 THEN D=D+3
8 LOCATE 22,D:PRINT P;:PLAY"A64":KEY(12) ON:KEY(13) ON:RETURN
9 KEY(12) OFF:KEY(13) OFF:SOUND 39,11:C=C-I:LOCATE 9,69:PRINT C:IF C=0 THEN 15
10 FOR T=1 TO 2000:NEXT:M=1:RANDOMIZE(C):X=RDND*35+10:V=RDND*2+2:LOCATE 1,9+C*4:PR
INT" ":KEY(12) ON:KEY(13) ON:GOTO 3
11 WIDTH 80:COLOR 4,3,2:CLS:KEY OFF:DEFINT B-V:B=1:C=1:DEF FNP(X,V)=INT(X+.5)*2
+V*160:ON KEY(12) GOSUB 6:ON KEY(13) GOSUB 7:LOCATE 10,20:PRINT"Left and right c
ursor keys move paddle.":LOCATE 12,15:INPUT"Input drag factor: (100 is Medium...
0 is FAST)":L
12 DEF FNZ=VAL(LEFT$(TIMES,2))*3600+VAL(MID$(TIMES,4,2))*60+VAL(RIGHT$(TIMES,2))
:B$="" :LOCATE 14,20:PRINT"Pick a paddle size: (Small, Medium or Large)":A$=IN
KEY$:IF A$=""THEN 12 ELSE IF A$="S"OR A$="s"THEN P=3 ELSE IF A$="M"OR A$="m"THEN
P=4 ELSE P=5
13 CLS:COLOR 1:LOCATE 24,15:PRINT"Stay on the Ball with PC Magazine":LOCATE 3,6
6:PRINT"PChallenge":LOCATE 8,66:PRINT"Balls left":LOCATE 11,65:PRINT"Initial Dra
g":DEF SEG=0:IF (PEEK(1040) AND 48)=48 THEN DEF SEG=&H8000 ELSE DEF SEG=&H8000
14 P$=B$+STRING$(P,219)+B$:FOR T=0 TO 9:POKE FNP(12+4*T,0),2:NEXT:FOR S=2 TO 54:
POKE FNP(S,1),219:NEXT:FOR S=2 TO 20:FOR T=0 TO 1:POKE FNP(T+2,S),219:POKE FNP
(53+P+T,S),219:NEXT:NEXT:COLOR 4:LOCATE,69:PRINT L:D=25:GOSUB 8:W=FNZ:GOTO 9
15 Z=FNZ:COLOR 1:LOCATE 17,66:PRINT"Time Spent":LOCATE 14,66:PRINT"Final Drag":C
OLOR 4:LOCATE,69:PRINT L:LOCATE 18,65:PRINT USING"#### seconds";Z-W:LOCATE 20,65
:PRINT"Want to play?":LOCATE,65:PRINT"again (y/n)?"
16 A$=INKEY$:IF A$="Y"OR A$="y"THEN RUN ELSE IF A$="N"OR A$="n"THEN CLS ELSE 16
```



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when laid side by side form the complete report.

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# The Arcade Opens

The PC's first good arcade-type game arrives; two others get low scores. Meanwhile, up on Everest...

Astro-Dodge, Digital Marketing  
Galaxy Master, Info Pros  
Set The Hostages Free, TessaSoft  
Everest Explorer, Acorn Software Products

**A**steroids was one of the first world-class arcade games—complex and fast moving. You were either immune to its appeal or you became an Asteroids maniac. Developed by Atari, this game appealed to a much wider audience than had any video game since the novelty of Pong wore off back in the last days before the information age, whatever that age was called. In a feature article in Esquire magazine, it was noted that three-piece-suited executives, lawyers, accountants and such, could be seen spending their lunch hour and lunch money playing Asteroids in arcades around Times Square.

Since then we have seen the arrival of Space Invaders, Missile Command, the insatiable PacMan, and all the rest. The best of these games present graphically a "fundamental psychological condition."

**YOU WERE**  
*either immune to its  
appeal or you became  
an Asteroids maniac.*

Electronics, which seems to abstract anything it touches, presents, in the good video games, the surreal conditions we experience in dreams: falling from great heights, being pursued or attacked, trying over and over to do something but never quite doing it. With PacMan we even get role reversal. The first three games reviewed here succeed or fail to the extent that they are graphic descriptions of the unconscious, or for you computer types, displays of a segment of (buried) memory.





Astro-Dodge is a close relative of Asteroids and follows similar products that have been released for the Apple and other micros. While no game is as good on a micro as its dedicated big brother in the neighborhood arcade, Astro-Dodge comes as close as possible. It fully maintains the spirit and appeal of the original.

The opening display in Astro-Dodge is a small triangle—a spaceship at screen center. Slowly and deliberately closing in on it from all sides are much larger, menacing asteroids—irregularly shaped and apparently mindless. This image of surrounding menace may be the source of Asteroids' appeal to professionals whose work is highly competitive and who are still young enough to have rivals and bosses. Further, the good Astro-Dodge player may shatter the asteroids into tiny fragments and finally destroy them altogether by shooting them. In the real world he might get a promotion, but in this game he gets more asteroids. (Maybe that is more realistic after all.) He also gets a little flying saucer, which, unlike the asteroids,



not as smooth. Sometimes the movements could be seen as stepped, rather than as a smooth flow. This game has two flying saucers instead of one, and the first is not much of a challenge. The second, however, is as deadly as a small mosquito in the tent on a camping trip; you learn to hate it.

Besides its relative slow speed, Astro-Dodge has one or two failings. Unlike many games, the high score is not posted—only the score for the present game. On the other hand, the instructions displayed on-screen are clear and easy to read. I was playing on a color monitor with the monochrome monitor displaying the instructions at the same time, which was convenient.

As stated earlier, no micro games can match the arcade version, but Astro-Dodge is one of the better ones. I played for an hour and quit only for lack of time. My best score was something over 8,000.

### Simple-Minded Galaxy Master

Coloxy Master is not in the same class as Astro-Dodge. It is a simple-minded game, though it has modest charm. It is a game, not of psychological states, but of coordination among one's eye, hand, and sense of timing. The display is extremely simple, consisting of very schematic objects. The spaceship looks like a stick character, space garbage like a dim cursor, enemy ships are asterisks, and the Galaxy Master is a symbol similar to the legal symbol for "section."

Galaxy Master, space garbage, and enemy ships move across the screen slowly,

Your ship can move in any direction by means of the four arrow keys on the keypad, at least until your fingers cramp, which won't be long. You shoot lasers of photons with the F1 and F2 keys and try to score points by hitting things. The Galaxy Master is the only one who shoots back and you have two minutes to score 600 points, which will restart the clock or you lose. You can also lose by shooting while moving upward, in which case you usually shoot yourself down. If you don't score high, you're called a "humorous opponent" or "foolish" earthling, or something of the sort, a sure sign of amateurish marketing to go along with simplistic programming. My best score in about 40 minutes of play was 955, which rates "fair." I like best that you could play the game with or without sound (fitting its advertisement as an "office game"), a choice more games should offer. It requires Advanced BASIC and an 80-column display such as IBM's monochrome monitor.

### Tinny Tunes

Set the Hostages Free is the least interesting of these games. From the disk it was not apparent who wrote it. It is another game of coordinating the movement of something on the screen with the timing of a key press. A space moves around the perimeter of a square. You may move your gun (two hi-res lines) around the outside of the square. You must time your shot to hit the moving space, allowing the bullet to travel through to eliminate one brick in the square, a la Break Out, an arcade game

---

**I**F THE  
game, like the rat race,  
becomes too much,  
you can always hit the  
hyperspace button...

---

shoots back. If the game, like the rat race, becomes too much, you can always hit the hyperspace button, disappear from your position on the path of doom, and instantly relocate somewhere else—the video world's version of three double martinis for lunch.

Astro-Dodge uses the F9, F10, INS, and DEL buttons for rotating counterclockwise and clockwise, for thrust and for firing, respectively. The space bar, appropriately, hurls you into hyperspace. The asteroids themselves were more round than in the arcade game, without the jagged edges. They looked plump and were yellow (this is a color game, if played on a color monitor). True to their appearance, the asteroids were not all that menacing. This game is also slower than the arcade version and



that was intermediate in the line of development between Pong and Asteroids. When all the bricks are gone, a number of hostages in the center of the square are released. I lost interest before I actually witnessed this. Perhaps the release of the hostages would trigger some unexpected wellspring of patriotic emotion. But I doubt it. This game requires Advanced BASIC and an 80-column display. Just as army generals in the poorest countries wear the most braid and brass, this game had the most tinny tunes accompanying its start.

### Because It Was There

Everest Explorer is a game of resource management, not an arcade game, so I asked my colleague, Edmund Hilarious, O.B.E. to review it, as he is much more qualified than I am in these matters. Here is his report:

"Bloody good game, old sport. We left Katmandu in late Spring—Goodwin, Hoskins, and the rest, including that doctor chap—and made base camp in two weeks,

with a lot of Sherpa fellows, can't ever remember their funny-sounding names. Spent \$80,000 getting there too, don't mind telling you, what with the cost of tents and

***S***PENT \$80,000  
getting there too,  
don't mind telling  
you, what with the  
cost of tents and  
oxygen...

oxygen bottles, fuel, meals, and of course the bloody Sherpas themselves. Over \$1,000 apiece they were, and unreliable at that, as I'll explain in a moment. On the third day one of the Sherpa's was lost in an icefall, poor soul. Name was Ang Phu, Any Phlegm, or something like that. That wouldn't have been so bad, of course, ex-

cept that the system crashed too, returning me to BASIC against my will and giving me a bloody division by zero, overflow at line number 76 error message. Hardly sporting, don't you know. A rather sudden descent too. Wonder I didn't suffer severe nosebleed. Of course, I tried the mountain again immediately. Always be an England, hey? This time got Base Two almost supplied. Goodwin was down for a few days with hypothermia, but he is better now. Our progress was no thanks to the Sherpas, by the way, who refused to climb past base camp after one of their number suffered an irreversible loss of life clearing out icefalls from the more difficult Western approach. When I saved all information to disk after an hour of play, the weather was cloudy with light snow and mild winds. I think that once the six of us climbers (I took only a small crew this time) get all the food and fuel to camp two, those cowardly Sherpas will change their tune all right.

"Well, wish me luck old bean. Cheerio for now."

/FC

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1345 Ave. of Americas, New York, N.Y. 10105



WordStar\*, the popular CP/M word processor is among thousands of programs that can now be run on the IBM PC with Baby Blue



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Corporation.

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Baby Blue is a trademark of XEDEx Corporation.  
Z80 is a trademark of Zilog, Inc.



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# Marketplace

The Independent Guide to IBM Personal Computers

## HARDWARE

### Oak Desk

Electroniture is a combination computer cabinet and desk handcrafted of solid oak, which provides a permanent home to the IBM PC.

The unit is "ergonomically human engineered, has a large work surface, a document holder, and space for peripherals and software storage."

The monitor cabinet has a nonglare glass screen that will enhance contrast and color without distortion.

Although the unit has room for a small printer, there is an optional, matching solid oak stand that accommodates both back- and bottom-feed printers using 15-inch and smaller fan-fold paper. An optional wire paper bale is available.

Price: Desk Unit \$895, Printer Stand \$225, Paper Bale \$25. Bench Collection 1387-D Cass Rd. Sonto Rosa, CA 95401 (707/526-1074)



"New on the Market" does not review products, but reports information provided by the manufacturer. If you have a product that you would like to have included in this section, please send a brief description that includes applications, price, and system requirements to New on the Market, PC Magazine, 1528 Irving St., San Francisco, CA 94122. Photographs and illustrations are run on a space-available basis.

### Space Tablet

The Space Tablet is a four-access system digitizer that consists of a pen that can be moved to various locations on an object so as to translate the dimensions into code that can be interpreted by the PC. The product works with both Chart Pro and Slide Pro software, described elsewhere in this section.

Micro Control Systems  
431 Vinoyard Point Rd.  
Guilford, CT 06437  
(203/643-4887)

### Screen Cover

A non-glare screen cover that darkens a "too light" background is new from PFM Products. The screen fits the PC monochrome display.

Price: \$15.95  
PFM Products  
9129 Coral Cove  
Dolles, TX 75231

### Printer "LEGGS"

Argus' "LEGGS" allows you to store paper underneath your Epson or IBM printer. The four legs take the place of the screws un-



der your printer, and can be installed in seconds, providing room for 3 inches of paper. Requires: Epson MX-80 or MX-100 or IBM Matrix Printer. Price: \$15.

Argus  
Box 9777  
Baltimore, MD 21204  
(301/321-8451)

### Print Spooler

Compulink's SooperSpooler is an "intelligent printer interface designed to free microcomputers from the mundane task of printing." The device allows you to quickly dump text or other data into a 18K buffer. SooperSpooler sends the data to your printer while you use your computer for something more creative. Other standard features include: pagination, formatting and headers.

Price: 16K Unit \$349. Memory Expansion \$159. Serial Port Option \$95.  
Compulink  
1840 Industrial Circle  
Longmont, CO 80501  
(303/651-2014)

### Disk Emulators

SemiDisk is a high-capacity memory board that operates like a 512K disk drive. Like a disk, there is a directory, and files can be written, read, and executed. Because it has no moving parts, it is much faster than a floppy or hard-disk system. Data or programs from your regular disks can be loaded into SemiDisk for instantaneous access.

Price: \$12 Kbyte System \$1,995. 1 Megabyte System \$2,995.  
SemiDisk System  
P.O. Box CG  
Beoverton, OR 97075  
(503/642-3100)

Another half megabyte disk simulator is JRAM. The board comes with "a set of software to make that memory directly usable by common software." Price: \$1,200 [with 500K of RAM]. \$400 [without memory chips].

Toll Tree Systems  
1036 Los Altos Ave.  
Los Altos, CA 94022  
(415/941-8748)

### Hard Disks

Santa Clara Systems has announced two hard disks for the PC. Their SCS-MiniMega is a 5 1/4-inch disk in both 5 and 10 megabyte versions. The SCS-Sabrina Series offers 10 megabytes of storage on a removable 8-inch Winchester cartridge, along with from 10 to 40 megabytes of fixed disk storage capacity.

Santa Clara Systems  
560 Division St.  
Campbell, CA 95008  
(408/374-6972)

### Internal Hard Disk

Professional Micro Systems is offering a 5 1/4-inch 20 megabyte hard disk that fits inside the PC system unit, replacing one of the two floppy disk drives. The hard disk supports PC-DOS and CP/M-86. The company also offers





# Marketplace

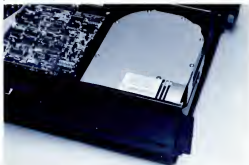
special hard-disk versions of MicroPro's WordStor word-processing system, Sorcim's SuperColc spreadsheet program, Systems Plus's Accounting Plus and MicroNetics' Client Write-Up and General Ledger.

Price: Disk Unit \$5,995.

AST's new memory board can be configured with 64K to 256K of add-on memory. It also includes a parallel printer port and an asynchronous port.

Requires: 64K.

AST Research  
17925 Sky Park Circle, Suite B  
Irvine, CA 92714  
(714/540-1333)



## Communications Port

Persyst has introduced an asynchronous communications controller for the PC that includes a rotating jumper plug to ease communications cabling, programmable baud rates from 50 to 19,200 baud, and dual channel option to allow one card to drive both a modem and serial printer.

Price: Single Channel \$130.  
Dual Channel \$195.  
Personal Systems Technology  
22657 La Codeno  
Laguna Hills, CA 92653  
(714/859-8871)

## Graphics Digitizer

The Graphic Analysis Package #1 includes a digitizer with 0.001" resolution, a digitizing stylus,

bus, a power supply, a communications interface cable, and an operator's manual and necessary software.

Price: Start at \$1,419 for 11" x 11" digitizer.

CTCO Corporation  
1055 First St.  
Rockville, MD 20850  
(301/279-8550)

## Data Base Machine

The IDM 2000 is a combination of relational data base management software and specially tailored hardware. The hardware is designed to enhance the performance of the relational data

and supports automatic proportional spacing, bold and shadow printing, underlining, super- and subscripting.

Requires: Parallel Port.

Price: \$2,250.

NEC Information Systems  
5 Millito Dr.  
Lexington, MA 02183  
(617/862-3120)

## SOFTWARE

### MBA Is First Software Combo

The MBA program (695) from Context Management Systems combines a spreadsheet simulator with word-processing, graphics, and data base management. A future version of the program will also include telecommunications software, which the company says it will give free to buyers of the current version.

In a preview for PC, the MBA program appeared a credible start toward the expected merger of single-purpose programs; but it suffered somewhat from the "jack of all trades, master of none" syndrome. Its word-processor, for example, is very rudimentary compared to programs dedicated exclusively to that job. As is expected for such integrated suites of programs, MBA requires a beefily equipped PC—at minimum: 192K of memory, a graphics adapter with high-quality monochrome monitor (the program uses only graphics, not color), two disk drives, and a printer with graphics capability (such as the Epson printer with Greitax option). MBA is written in Pascal for the UCSD operating system, whose "run-time" elements are included on the MBA disk.

The centerpiece of MBA is its spreadsheet simulator, which is operated using a command set modeled upon and expanded

from that of the VisiCalc program. Where MBA starts getting interesting is that you can fill its spreadsheet cells with values drawn from a data base created using another arm of the program. After twiddling the spreadsheet to your satisfaction, you can then, in the program's terms, "change contexts" to the word-processor and create a memo that leads in to your figures. Then you can change contexts again, to graphics, and order selected rows and columns of the figures interpreted as a pie chart or in other graphic fashion. The text, figures and charts appear together on your screen (which displays text and graphics alike in high-resolution graphics mode), and matching copies can be made on paper if your printer is equipped for it. Context Management Systems  
23864 Hawthorne Blvd.  
Torrance, CA 90505  
(213/378-8277)

### Word-Processing

EasyWriter II. Information Unlimited Software, the producer of IBM's EasyWriter has released a totally new word processing package called EasyWriter II. Pages appear on the screen just as they appear on paper, complete with headers, footers, onscreen underlining, boldface and double underlining. Printing can be done direct-



ly from the editor, eliminating the need to save short memos to disk. The simultaneous print and edit feature makes it possible to route up to ten documents

model. The hardware/software package makes it possible to run applications previously requiring much larger computer systems.

Insoc Software  
2390 Peachford Rd., Suite 3235  
Atlanta, GA 30338  
(404/452-7676)

### Parallel Printer

The new NEC Spinwriter Model 3550 letter quality printer can be plugged directly to the PC's parallel printer port. A parallel port is included on the card used for the IBM monochrome display. The 3550 printer allows users to select from over 50 print thimbles designed for word and text processing. The printer accepts paper up to 16 inches wide



to the printer while editing another.

Requires: 64K 2 Disk Drives.  
Price: \$350.

Information Unlimited Software  
281 Arlington Ave.  
Berkeley, CA 94707  
(415/527-9526)

Wordnet86 is a new word-processing program that incorporates date entry and text data merge capacity. Using all the PC's function and cursor control keys, its features include horizontal scrolling, block move and copy, search and replace, and numeric tabbing. Disk file handling, printing, system interaction, and help files are menu driven.

Requires: 64K Two Drives.

Price: \$395.  
Monoson Microsystems, Inc.  
51 Main St.  
Watertown, MA 02172  
(617/824-2124)

Finalword is an integrated word-processing system. In addition to standard operating features such as automatic word wrap, global search, and justification, Finalword offers several unique text editing and formatting capabilities. "Chapter Command" will center numbers, boldface chapter headings, and create appropriate entries in the Table of Contents. Further, during output, the menu-driven program can create an index, complete with appropriate pagination, and number footnotes. Additional features are split-screen capability, directory access during the editing process, and simultaneous editing and printing capability.

Requires: 56K memory, PC-DOS.

Price: \$300.  
Mork of the Unicorn  
P.O. Box 423  
Arlington, MA 02174  
(617/489-1387)

Designed for the first time IBM PC user (as well as the expert), the Volkswriter word-processor includes an interactive on-screen tutorial and a complete reference manual. It uses 20 function keys with an on-screen reference guide.

Requires: PC-DOS.  
Price: \$185.  
Lifetree Software, Inc.  
177 Webster St., Suite 342  
Monterey, CA 93940  
(408/659-3221)



### Spelling Checkers

Eosyspeller is an innovative spelling-checker and proof-reading package. Using an 88,000-word dictionary, it flags misspellings and offers the user a chance to substitute the correct spelling. The system can also create supplementary dictionaries for jargon and abbreviations. It further allows the user to correct the same mistake within a file by pressing a single key. The system also displays the entire line in which the flagged word appears, enhancing ease of readability.

Requires: PC-DOS.  
Price: \$175.  
Information Unlimited Software  
281 Arlington Ave.  
Berkeley, CA 94707  
(415/525-9452)

Another spelling-checker in the PC marketplace is the updated Spellguard 86. Designed for use with a CPM-86 operating system, this version speedily proofreads documents at rates exceeding 20 pages per minute using a 20,000-word dictionary.

Requirements: CPM-86 DOS.  
Price: Spellguard \$295. British Dict. \$35 till 8/30; then \$125.  
Innovative Software Applications

1150 Chestnut Lane  
Menlo Park, CA 94025  
(415/326-0805)

### Mail Management

Two new mail managers geared to the IBM PC user are on the market. Mail Manager will create and update address files, create subfiles, merge files, and sort using a variety of key fields. Starware plans on releasing several other IBM PC packages including: Groomer for teachers, Data Analyst, Listpro (for creating custom form letters), and Pfofole (an order-entry package).

Price: \$49.  
Starware  
1629 K Street NW, Suite 551  
Washington, D.C. 20006  
(202/337-5300)

EZLabel is a mail management program geared to the small business employee and computer neophyte who lacks the time to master a more complicated system. The company will follow this product with a similarly "simple" line-oriented word-processor and home finance program. All are in the lower price range.

Price: \$39.95.  
Systemics  
3050 Spring St.  
W. Bloomfield, MI 48033  
(313/851-2504)

### Communications

Ligon, an auto-dial, auto-answer communications software package supporting the Hayes Smartmodem, features menus, directory of frequently called numbers and host computer configurations, automatic retransmission of erroneous data, selectable number of columns (screen width) and ability to "chat" off-line without losing

carrier. Written in UCSD Pascal 4.0.

Requires: 64K, Serial Cord Disk.  
Price: \$150.

Ferox Microsystems  
1201 N. Ft. Myer Dr.  
Arlington, VA 22209  
(703/841-0800)

Crosstalk Version 2.0 allows a PC or CP/M computer to access almost any ASCII dial-up computer system. It captures and stores received data and sends pre-edited files to a remote computer system. The company is releasing both PC-DOS and CP/M-86 versions.

Microstuf  
1900 Leland Dr., Suite 12  
Morristown, NJ 07960  
(609/852-0267)

PC MODEM communications program for the IBM PC features include: continuous auto-dialing, auto-answering, send-receive ASCII files which can be read from or written to PC-DOS files up to 600 baud, menu drive, and switches between touch-tone and rotary dialing.

Requires: 64K, IBM Communications Adapter (or equivalent), PC-DOS, BASICA, Disk Drive, D.C. Hayes Smartmodem.  
Price: \$49.95.

System Software Services  
1765 Raleigh Lane  
Hoffman Estates, IL 60195  
(312/843-8544)

ASCOM is an asynchronous communications program for users who routinely send or receive program or data files between a PC and another computer. The PC version of ASCOM is compatible with ASCOM on any CP/M system. Requires: PC-DOS, Serial Communications Module.

Price: \$175 including software and manual.  
Westico  
25 Von Zant St.  
Norwalk, CT 06855  
(203/853-6880)





# Marketplace

## Terminal Emulator

R/NET, an abbreviation for Rational Network, was created to allow the IBM PC to connect directly or remotely to minicomputers supporting the ADDS terminal. Because R/NET can capture minicomputer data on the PC's disks, it is possible to manipulate data off-line. The system includes software, documentation and a cable to connect the PC to a minicomputer. Price: \$200.

Cosmos  
10626 148th Ave. SE  
Renton, WA 98056  
(206/226-9362)

## Phone Log

Phone Chronicle from Sycon logs outgoing calls and is intended for single telephone line users who need to monitor internal telephone use for billing or cost control purposes. The program sorts, organizes, and presents calls in a report format which includes the date, telephone number, time and length of call, and three-digit individual employee/account code.

Consisting of a PC board, telephone plug, cable, diskette, and user's manual, the unit has an on-board memory of 100 calls, and signals when memory is reaching the limit. It uses an external A/C adapter to supply power when the computer is not in use. A multi-line version is under development.

Price: \$395.  
Sycon  
3040 Scott Blvd.  
Santo Clara, CA 95051  
(408/727-2751)

## Payroll

Payroll Master can process up to 200 employees on a two-disk PC. It supports six user-defined deduction fields and gives definable pay rates for each employee. Multi-state and mixed-department labor analysis are also offered. A Tecom hard disk

version is also available.

Price: \$495.  
ASTEC  
223 Hunnewell St.  
Needham, MA 02194  
(617/444-5551)

## Dow Jones

Another IBM release, Dow Jones Reporter enables an IBM PC user to gather business information from the Dow Jones News/Retrieval Service. It provides access to a variety of information including financial news, stock market quotations, and company profiles.

Price: \$100.  
IBM  
(800/447-4700)

The Personal Investor automatically connects your PC with the Dow Jones News/Retrieval Service giving you access to "the most authoritative financial information in the world." Stories and reports as new as 90 seconds or as old as 90 days can be viewed from The Wall Street Journal, Barron's, and Dow Jones News.

The Personal Investor includes several modules. The "Portfolio Manager" records stock purchases, dividends, and sales of stocks. The "News/Terminal" works with Dow Jones and most other information services. The "Quotes Screen" automatically signs on to the Dow Jones service, collects quotations on preassigned stocks, and signs off. The quotations can be printed or viewed on the monitor, after the Dow Jones service is disconnected. The package includes software and a 58-page manual.

PBI Corporation  
P.O. Box 589  
Woyzato, MN 55391  
(612/473-3769)

## Financial and Accounting

The Boss from XEDEX Corpora-

tion is a new financial accounting package that includes General Ledger, Accounts Receivable, and Accounts Payable modules. The company plans on releasing several other interactive modules by fall. XEDEX will provide user support via a technical "hotline" service.

Requires: XEDEX Baby Blue. Will work with 5-megabyte hard disk drives or two 8-inch floppy disks with 200K Memory (IBM 5-inch floppy disks will store only 160K each). Price: \$2,495. Combined price with Baby Blue \$3,095. XEDEX Corporation  
1345 Ave. of the Americas  
New York, NY 10105  
(212/489-0444)

Another set of Accounts Payable, Accounts Receivable, General Ledger, and Payroll programs is available from: Zeta Products  
P.O. Box 147  
Georgetown, TX 78626  
(512/863-3079)

A new series of business programs for the IBM PC includes: Payroll, Job Costing, Accounts Payable, Accounts Receivable, and General Ledger. Computer Systems Design  
P.O. Box 735  
Yokimo, WA 98907  
(509/575-0320)

## More Business Tools

IBM has released Inventory Control by PeachTree Software to help companies manage their inventory assets. The program is designed to assist a small business improve its merchandise control, reduce inventory investment, and improve customer service and response. The program may be customized to suit a company's needs.

Price: \$595.  
IBM  
(800/447-4700)

Chart Pro produces graphics on the screen (monochrome or color) and the Epson or IBM printers. It can produce charts, bar graphs, and linear data from information you enter directly or through VisiCalc files. A companion program, Slide Pro, produces copy that can be thermofaxed for overhead projection slides. The product allows you to move your cursor around, drawing flow charts, block diagrams, and the like. \$49.50 for each product.

Price: \$595.  
Micro Control Systems  
431 Vinoyd Point Rd.  
Cullford, CT 06437  
(203/643-4897)

Time Manager from IBM and MicroSoft, Inc. enables the PC user to organize and plan activities while maintaining records for future reference. By recording events as they happen, the user can later retrieve a summary of those events, as well as organize and update data. Totals can be created in several categories for tax verification, expense reports, and project evaluations.

Price: \$100.  
IBM  
(800/447-4700)

MicroCANTT is a project-planning system designed for users who perform time-and-cost analyses. The programs use the Critical Path Method technique to determine task dependencies and project completion dates. When an aspect of a project is modified, the plan is immediately redisplayed to reflect the new schedule.

Price: \$395 with Documentation. Manual \$25.  
Westco  
25 Von Zant St.  
Norfolk, CT 06855  
(203/853-6860)



## Business & Engineering

**HAL 9000**, a new line of Business and Engineering software, has been introduced by Keller. It consists of:

—**HAL 1000 Business Software** with General Ledger, A/R, A/P, Inventory and General Business applications.

—**HAL 2000 Engineering Software** with Civil, Scheduling, Cost Engineering, and Electrical applications.

—**HAL 3000 Statistical Software** with general applications.

Requires: PC-DOS.

Price: Statistical Package \$395. Business and Engineering Software \$495. Civil Engineering \$595. Business Inventory and Cost Accounting \$695.

Keller Software  
1825 Westcliff Dr.  
Newport Beach, CA 92660

lists, risk analysis, and tracking claims. Word-processing is included.

Requirements: 64K Memory, 2 Disk Drives, Monitor, Printer. Price: \$850.

Metamorphics, Inc.  
154 Montgomery Ave.  
Bala Cynwyd, PA 19004  
(215/668-9000)

Electronic Memo Register was designed especially for insurance agents who have "hundreds of follow-up messages to track."

Metamorphics, Inc.  
154 Montgomery Ave.  
Bala Cynwyd, PA 19004  
(215/668-9000)

## Banking

Ampersand Corporation introduced its Bronchbanker series for financial institutions. The

income-property models are capable of analyzing variables such as purchase price, financing structure, tax implications, cash-flow and after-sale profitability.

Price: \$99.50.  
Simple Soft  
480 Eagle Dr., Suite 101  
Elk Grove, IL 60007  
(312/364-0752)

## Data Base Manager

**EasyFiler** is an "information processor" from Information Unlimited Software. The data base management system allows the user to enter, manipulate, and report a variety of data. The software is designed to handle up to 100 megabytes of data, if you can find a disk that will store that much. **EasyFiler** has its own limited editor, so it is possible to create form letters and use the product as a stand-alone mail-merge program. Each listing (record) in the data base can have up to 50 items.

Requires: 2 Disk Drives, 64K. Price: \$400.

Information Unlimited Software

281 Arlington Ave.  
Berkeley, CA 94707  
(415/525-9452)

## Disk Library Program

The **Floppy Disk Library** is designed to "take some of the drudgery out of keeping track of floppy disks and files."

Price: \$39.95.  
Little Bit  
469 Edgewood Ave.  
New Haven, CT 06511

## Spreadsheets

IBM announces the release of **VisiCalc** version 1.1. The revised version of this best-selling spreadsheet program will now accommodate up to 256K of user memory and will support additional parallel and serial printers. **VisiCalc's** producer, **VisiCorp**, will automatically issue the upgraded version at no

charge to all registered owners. Requires: PC-DOS, One Drive, 64K.

Price: \$250. No charge for update.

**VisiCorp**  
2895 Zanker Rd.  
San Jose, CA 95134  
(408/946-9000)

**Ferax Microsystems**, makers of **MICRO-DSS/F**, is offering a menu-driven financial modeling package for the PC. It features "what-if" calculations, 32,000 cell built-in financial functions, and report generation. Includes run-time **UCSD Pascal 4.0**.

Requires: 2 Drives, 128K. Price: \$1,500.

**Ferax Microsystems**  
1701 N. Ft. Myer Dr.  
Arlington, VA 22209  
(703/641-0800)

The **SuperCalc** Electronic Spreadsheet for the PC allows users with color monitors to see negative values displayed in red, and formulas in yellow. 256K users will be able to fill in all 16,000 cells of the worksheet with five-digit numbers—enough space to allow 10-year projections by month.

Price: \$295  
Sorcim  
405 Aldo Ave.  
Santo Clara, CA 95050  
(408/727-7834)



## For the Home

**Household Inventory** enables homeowners to maintain records of their valuable posses-



**Econocomp Services, Inc.**, is releasing a line of engineering software for the IBM PC. Included are structural, geotechnical, and hydraulics programs.

**Econocomp Services, Inc.**  
89 State St.  
Guilford, CT 06437  
(203/453-4386)

## Insurance

A new line of software geared specifically for insurance agents has been released. Nine modular programs in the series cover wide-ranging aspects of insurance sales: compiling prospect

package currently consists of a Master and Individual Retirement Account (IRA) modules.

Requires: 64K, Printer. Price: \$595 (Master Module and One Accessory).  
Ampersand Corporation  
128 S. George St.  
York, PA 17405

## Real Estate

The **QuickCalc Real Estate Investor** is a template model for the IBM PC, using either **VisiCalc** or **SuperCalc**. The system displays information in a worksheet format. The residence and



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sions for insurance purposes. The program catalogs and cross-references household items (up to 100 in 25 rooms) keying in such information as serial number, purchase date, and value. Price: \$95.

**What Do We Name the Baby?** draws upon a 2,500-name database to generate lists of names defined by series of parameters chosen by the prospective parents. Requirements: 48K Memory, Single Disk Drive. Price: \$15. Metamorphics, Inc. 154 Montgomery Ave. Bala Cynwyd, PA 19004 (215/668-9000)

## Education

Two new software educational packages have been introduced into the marketplace. SchoolDaze provides the answers to hundreds of arcane and rarely asked questions, and can create a Timeline of any size. Requires: 32K Memory, Disk Drive, Printer for Timeline Function Only. Price: \$25. SchoolDaze by Metamorphics 154 Montgomery Ave. Bala Cynwyd, PA 19004 (215/668-9000)

**Moth Drills** offers mathematical exercises geared toward the elementary age group. The program generates problems in many difficulty ranges. A user's scoreboard monitors progress and missed problems and supplies the correct answers. Requires: 36K Memory, 1 DD, 80-Column Monitor. Moth Drills by Starware 3901 Davis Place N.W. Washington, D.C. 20007 (202/337-5300)

## Games

**Space Guardians** requires its players to travel the galaxy, searching out and destroying

alien warships. Requires: 84K, One Drive, 80-Character Display. Price: \$29.95. Omnic 1268 Main St., #207 Newington, CT 06111 (203/666-4240)

The makers of **Galaxy Master** have dubbed their new product the "office game" because the user can elect to turn off the sound in an office environment. Movement around the screen is accomplished through cursor controls and the user gets to press F1 to fire lasers or F2 for "photon torpedoes." Price: \$29.95. Info-Pro 2102 Business Center Dr., #132 Irvine, CA 92715 (714/851-8975)

## Keyboard Enhancers

The **Keystone Keyboard Enhancer** allows the user to specify repetitively typed phrases or control functions with a single key stroke. The strings may contain any legal ASCII characters, thus making it possible for you to re-define many of the PC's keys. The program becomes part of the disk operating system and remains in memory until you reboot or turn off the power. The program allows you to save and complete keystrokes (macros) to disk files. Includes a quarterly software newsletter with program enhancements and updates. Quoted price is an introductory offer and is subject to change after July, 1982. Requires: PC-DOS, One Drive. Price: \$29.95. Cerard Cerchio System Consultants 1110 Whirlow Pl. San Jose, CA 95131 (408/923-0911)

## Utilities

Note: Disk Utilities are tools that aid in the interface between

the computer user and the disk operating system; that is, the environment in which computer software operates. Some utilities (like CP+) are for novices and others (like DiskLook and Jools/86) are more suited for programmers or advanced users. CP+ replaces CP/M commands with a series of "simple, English-language 'menus,' messages and directions." It currently works only with CP/M-80 systems, but its distributors plan to release a version for the Baby Blue (see story this issue) equipped for PC as well as for CP/M-86. Price: \$150. Taurus Software Corporation 870 Market St., Suite 817 San Francisco, CA 94102 (415/788-0888)

**Disklook** is a menu-driven set of PC-DOS utilities which allow users to "browse through any file, display any diskette sector, graphically map diskette usage and the location of any file, display erased file names, reveal hidden files, display complete directory information, and enable the user to learn more about how files are copy protected." Requires: PC-DOS, 64K, One Disk Drive. Price: \$20. Unerase (recovers erased diskette files) \$20. PusFor (formats Pascal programs to user-controlled standards) \$20. TimeMark (displays time, date, and elapsed time) \$5. Peter Norton 1716 Main St. Venice, CA 90291 (213/389-3948)

## Operating System

The **Oasis 16** operating system turns the IBM PC into a multi-user business microcomputer. It simultaneously coordinates up to three users on a standard system and up to 32 users with appropriate bus expansion. The system provides for private or

shared public files, optional passwords, and privileged level security access. It is compatible with Z-80 Oasis Basic and C applications software, making over 500 commercial programs immediately available. Supports Corvus hard disks. Price: \$1,495. Phase One 7700 Edgewater Dr., Suite 830 Oakland, CA 94621 (415/562-8085)

## CP/M Emulator

**I-DOS** is a version of the native "PC-DOS" operating system for the PC. It supports Professional Micro Systems' 20 and 40 Megabyte 5 1/4-inch Integral Hard Disks and CP/M-80 and CP/M-86 under the native PC-DOS.

Both CP/M programs or files and PC-DOS programs and files can run in the same "areas" or "volumes" on the disks.

In **I-DOS** "configure program," the hard disk and floppy disk can be assigned any logical drive letter and "volumes" can be of any size, within disk size constraints.

**I-DOS** has a menu-driven copy, rename and erase utilities. It has a built-in Communications Program that utilizes Hayes Smartmodem, Novation Modem and other RS-232C Modems.

Professional Micro Systems Newport Beach, CA 92660 (714/851-8655)

## COBOL Language

**IBM Personal Computer COBOL Compiler** by MicroSoft is a software product that lets the user develop programs in COBOL, a language designed for business applications. The IBM COBOL is a version of the popular ANSI 1974 level standard with extensions that support color and screen formatting. IBM (800/447-4700) /PC



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# Product Reports

*Tecmar Proliferates PC Products; New VisiSeries; MicroPra Releases WardStar; and IBM Announces Double-Sided Disk Drives.*

## Tecmar Proliferates PC Products

*Speech Master, PC-MATE, Speed Disk, and More to Come.*

Tecmar  
23600 Mercantile Rd.  
Cleveland, OH 44122  
(216/464-7410)

When IBM released the PC in October 1981, several companies jumped on the bandwagon with software and hardware add-ons. None were quite as prolific as Cleveland's Tecmar Industries, which introduced more than 20 PC-related products by the time this magazine's first issue

By including a few lines of code at the top of your BASIC programs, you can LPRINT directly to the Speech Master Board, according to a Tecmar spokesperson. But even if you don't know a word of BASIC, you can use a simple PC-DOS command to route text to the speaker. PC-DOS includes a command that allows you to route a file to the screen by typing TYPE FILENAME. If you want that same file printed, you precede the TYPE statement with a CTRL P (for PRINT). With Speech Master, according to Wertman, you type CTRL T (for talk) and the text is spoken rather than displayed or printed. Your Speech Master, in essence, becomes another list device.

Words are pronounced on a "synthesis by rule" basis. If you don't like the machine's pronunciation, you can retype the word phonetically.

A production model was not available for testing as PC went to bed, but we'll soon play with one and let you know what it has to say for itself. Price: \$395 for the Board; \$95 for software.

### Hard Disk/Expansion Chassis

Another new Tecmar product is the 10-megabyte (10-million-character) version of their combination hard disk/expansion chassis. The PC-MATE Winchester/10, like their previously announced five-megabyte hard disk, is enclosed in the PC-Mate Expansion Assembly, which looks remarkably similar to the PC itself and contains its own power supply and six additional expansion slots. Price: \$3,995.

### Programs Increase Use of Memory Boards

Speed Disk is a program that allows a 192K memory expansion board to simulate a floppy disk. The result is a logical disk device that is "totally compatible for normal system operations and provides speed increases of between 5 and 50 times that of the IBM mini-floppies." Although it was designed to work with Tecmar's PC-Mate Dynamic RAM Option, it should work

with any 192K memory expansion board. Price: \$40.

Tired of waiting for your printer to let you use the PC? The RAMspooler allows data sent to a printer to be buffered, thus freeing the PC to perform other tasks while the printer is busy. Like Speed Disk, it requires a 192K memory add-on board.

## New VisiSeries VisiCalc Business Campanian Series

VisiCorp  
2895 Zanker Rd.  
San Jose, CA 95134  
(408/946-9000)

The most expensive element in many computer systems is neither the hardware nor the software. The time and expense of entering data, whether words or numbers, can add up to a very substantial investment. As a result, a company that offers an integrated line of software, able to make several uses of the same data, has a distinct advantage in the marketplace.

## THE VisiDex program operates like a giant set of index cards...

VisiCorp (formerly Personal Software) is already pre-eminent. Their VisiCalc spreadsheet program is the world's best-selling software program.

That's a tough act to follow, but the "VisiSeries" is likely to open up a lucrative after-market from VisiCorp's plenti-

**ONE**  
*of their new plug-in  
devices teaches the PC  
to talk back to you—in  
audible English.*

hit the streets in January. Now they're back with several more.

### Talkin' Terminals

One of their new plug-in devices teaches the PC to talk back to you—in audible English. According to Tecmar Vice President Dave Wertman, the Speech Master Board is treated by the PC like a monitor or a printer, but instead of the output being displayed or printed, it is enunciated through the device's on-board speaker or through an amplifier or tape recorder connected to the Board. You can write your speeches in BASIC or in PC-DOS text files that can be created with a word-processing program.



ful supply of VisiCalc customers.

The VisiSeries is an interrelated set of business programs for planning, analyzing, forecasting, budgeting, and answering "what if" questions. Along with VisiCalc, the series for the PC now includes: Visi-File, VisiTrend/Plot, VisiDex, and Desktop/PLAN.

VisiFile stores business records in a flexible format and can be used either for simple applications such as organizing a mailing list, or complex ones such as inventory management. A single diskette stores up to 12 files. A maximum of 32,000 records can be stored within each file. Users with 64K of memory can specify up to 48 fields per record and 256K users can specify up to 128 fields. The program is menu-driven and includes a "help" feature to aid user understanding. Available: third quarter 1982. Price: \$300.

The VisiTrend/Plot program allows the user to take data entered through Visi-

The Desktop/PLAN program uses a series of menus to guide the user through a financial modeling session. The user creates a model, beginning with row and column titles, inputting initial values, and deciding on row and column formulas for later calculation. The computed-values file can be printed out with headers, footers, pagination, and other formatting aids. The program includes a high-resolution graphing feature that can be used with systems equipped with an IBM Color Graphics Adapter only. Available: May 1982. Price: \$300.

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## MicroPro Releases WordStar

*Popular word-processor now available for the PC*

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MicroPro International  
1299 4th St.  
San Rafael, CA 94901  
(415/457-8990)

WordStar is to word-processing what VisiCalc is to spreadsheet programs—very popular.

Just before press time MicroPro International released its long-awaited PC-DOS version of the WordStar word-processing program. Although there was neither time nor space for a full review, we took a quick look at the program. It

---

**WORDSTAR**  
*is to word-processing  
what VisiCalc is to  
spreadsheet  
programs — very  
popular.*

---

was tested with only an Epson MX-80 printer (from which the IBM printer was cloned). A more thorough review will be included when PC reviews several word-processing programs.

The PC version represents at least three firsts for its publisher, MicroPro In-

ternational: This is the first time MicroPro has released a non-CP/M version (it

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**As  
a result, we  
recommend WordStar  
users have at least  
92K of internal  
memory.**

---

runs under PC-DOS); it is the first time MicroPro has used a computer's function or arrow keys; and it is the first WordStar to work with more than 64K of internal memory.

The standard WordStar requires the use of the CTRL keys plus one or more letter keys for everything from a mundane backspace to stellar block moves. For computers other than the PC, even if they have arrow keys, it is necessary to use CTRL S for left arrow, CTRL D for right arrow, CTRL E for up, and CTRL X for down. These CTRL keys will work on the PC version, but they are duplicated by the arrows on the number pad.

The PC's ability to handle more than 64K of memory presents some advantages. We ran WordStar on both a 128K IBM and a 64K NorthStar Horizon. The PC was able to print one file while we edited another. When we tried this on the NorthStar, its printer sometimes paused while we typed.

Block moves—moving text from one part of a file to another—were easier on the 128K PC. The PC's extra memory made it possible to move text in larger chunks.

When we tested WordStar on a 64K PC, we were disappointed with the small amount of space for block moves and the slow response time when moving the cursor from the top to the bottom on a large file. As a result, we recommend WordStar users have at least 92K of internal memory.

WordStar does not make as extensive use of the PC's function keys as do some of the other word-processing programs. But they can be used for help menus, setting tabs, left and right margins, underlining, boldface, block markers, and

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**THE  
time and expense of  
entering data,  
whether words or  
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Calc and create charts and graphs along with statistical reports including linear regression, standard deviation, mean, median, and the like. Displays may be saved on diskette for later use in presentations. Graphs may be printed with the IBM or Epson MX-80 with grafrax and several other graphic printers. Available: third quarter 1982. Requires: IBM Color Adapter for high-resolution graphics. Price: \$300.

The VisiDex program operates "like a giant set of index cards that may be cross-referenced thousands of ways." Its applications include personnel information, sales reports, financial details, or short reports. Each "card" can be stored on disk and cross-referenced against a number of special words or dates (called "key-words"). Available: third quarter 1982. Price: \$250.





Once you've chosen the IBM Personal Computer, your next considerations are enhancing your unit's productivity and providing for its longevity. By combining a Computer-Mate Desk with an Electrohome Monitor, you can accomplish both. Exclusively designed to match your IBM System, the Computer-Mate Desk protects your components, provides ample storage space and a large work area. ■ Protective recessed bay for CPU and Disk Drive assures ample work space ■ Master switch for simultaneous activation of system ■ Self adhesive wire supports to eliminate cord clutter ■ Cord drop space for flush wall placement and cable protection ■ Rear air space for proper ventilation ■ Adjustable leg levelers ■ Proper keyboard height to eliminate fatigue ■ Two roller drawers for storage ■ Gray color with black accents to match IBM system—Available at ComputerLand Stores—The Electrohome Monitor has advanced electronic technology and design innovations to assure crisp, clean, reliable video display with excellent resolution. ■ Medium or high resolution for improved graphic display ■ 80 character text display capacity ■ 16 color RGB output means more color variations ■ Compatible with IBM, Apple and other name computers ■ Backed by nation-wide service network ■ One year unconditional warranty — parts and labor—Available at ComputerLand and other fine computer stores—Make sure your computer system gives you the performance you need by choosing the best complementary components

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sending the cursor to the top or bottom of the file.

The cursor control keys on the numeric pad can be used to move the cursor to the top (home) or bottom (END) of the screen, to scroll up (PgUP) or down (PgDn) one screen full of text, and to move the cursor to the left, right, up, or down. This all may seem unexciting, but to old WordStor users it's a great improvement.

Despite the inclusion of some cursor and function keys, it is still necessary to use CTRL keys for a number of functions. To exit the editor and save a file to the disk, for example, it is necessary to type CTRL K D. This sounds cumbersome, but most people get used to it quickly. Nevertheless, one wonders why they didn't make more creative use of the PC's 40 function keys (programmers can hook up F1 through F10 as well as those keys in conjunction with ALT, CTRL, or SHIFT).

Choosing how to use the function and arrow keys is admittedly arbitrary, but I would have done things differently. MicroPro uses F10 to go to the top of the file and F9 to go to the bottom. This seems to be the reverse of what is logical. One would assume that the DEL(ete) key is used to delete the character over the cursor. Instead, it is used as a destructive backspace. The key that IBM designated for destructive backspace is redundant with the cursor to the left key. Price: \$495.

## IBM Announces New PC Products

*Double-Sided Disk Drives, New DOS, and additional software.*

IBM  
Entry Systems Business  
P.O. Box 1328  
Boca Raton, FL 33432  
(305/998-6007)

The diskette storage capacity of the IBM Personal Computer has been doubled. Several new programming and application packages have been added and prices for two attachments have been reduced.

The doubling of diskette storage brings capacity per drive to more than 320,000 bytes. The new programming aids are an enhanced version of the Disk Operating System (DOS), a BASIC language compiler and new inventory control and accounts receivable application programs.

The IBM printer and 160,000 byte disk-

**THE**  
*doubling of diskette  
storage brings  
capacity per drive  
to more than 320,000  
bytes.*

ette drive now sell at IBM Product Centers for \$555 and \$450, respectively.

### 320K Diskette Drive

The new 320K diskette drive accommodates up to 327,680 characters of programs and data of 5-1/4 inch diskettes, enabling users to store and update information on either 320K double-sided or 160K single-sided diskettes.

The greater storage capacity and programming flexibility of the new diskette drive means that applications currently running on the IBM Personal Computer can take advantage of larger data files, providing for future growth. The 320K diskette drive is supported by the new version of the DOS, as well as by the CP/M-86 and UCSD p-System, Version IV.0 operating systems. Price: \$650.

### New Disk Operating System Version

The Disk Operating System Version 1.1 by Microsoft Corp. supports up to two 320K or 160K diskette drives, or a combination of each. Version 1.1 with Disk and Advanced BASIC includes several enhancements.

With it, information can be written on or read from diskette drives at higher speeds, for faster processing and improved response times. In addition, DOS 1.1 provides asynchronous communications setup and support to direct parallel printer output to a serial printer, or to a remote printer via an available asynchro-

nous communications adapter. The new DOS sells for \$40.

### BASIC Compiler

The IBM Personal Computer BASIC Compiler by Microsoft Corp. enables users to write and test programs with the BASIC Interpreter and then compile the programs into machine-level code. This can improve program execution speeds significantly. Once they are distributed, compiled programs cannot be listed or modified. Price: \$300.

### IBM Announces Additional Business Series Software

Two application packages which can help companies manage inventory and accounts receivable were also announced for the IBM Personal Computer.

Inventory Control by BPI Systems, Inc. provides quick access to the status of any

**I**  
*INFORMATION  
can be written on or  
read from diskette  
drives at higher speeds,  
for faster processing  
and improved  
response times.*

inventory item, including list prices and quantity on hand, enabling sales orders to be checked and changed as they are entered. Customer invoices can be created and stock levels adjusted automatically. In addition to alerting users to items which must be re-ordered, the program can also produce the appropriate purchase orders, as well as log back orders and merchandise received. Price: \$425.

Accounts Receivable by BPI Systems, Inc. helps manage a company's cash flow by tracking current and past-due receivables. In addition to providing information necessary for timely, accurate credit decisions, the program prepares monthly customer statements and past-due notices, eliminating many manual billing procedures. It also prepares monthly aged receivables reports, maintains detailed customer files, and produces rapid analyses of customer account status. Price \$425./PC



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## **Fun Package\***

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## **Business Package\***

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## **Home Package\***

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A different kind of programming language, PC-FORTH takes some getting used to. But many who learn it love it.

PC-FORTH, Laboratory Microsystems, 4147 Beethoven Street, Los Angeles, CA 90066. 213/306-7412. \$100

The new FORTH programming language from Laboratory Microsystems for the IBM Personal Computer, PC-FORTH, is a clean, fast, very flexible language, which, if you're familiar with only BASIC and its kin, will take some getting used to. It's an example of what computer scientists call "threaded, interpretive languages" (TILs)—a class becoming more popular for microcomputers, especially in process control and data acquisition systems, because they are very efficient in the use of a computer's internal resources. FORTH runs very fast compared to conventional languages such as BASIC, and it requires less user memory for doing comparable work. It was originally developed by an astronomer for "real-time" control of scientific instruments and for heavy-duty data-crunching. Except by hand-coded assembly language, FORTH is still nearly unbeatable for microcomputer applications of that kind.

**GLANCING**  
at the clock, I noticed  
it was early evening;  
the next time I looked  
at the clock, it was  
early morning!

The one big disadvantage of FORTH is that its code is not easy to read or explain, especially for novices or those used to more conventional languages. It has been used so far mainly by systems programmers, engineers, hobbyists, and others willing to learn its particular idiom, having polarized those exposed to FORTH into either zealous partisans or vehement opponents of the language.

## A FORTH program and how it works:

One of the traditional benchmarks used to test programming languages is the Sieve of Erasthotes algorithm for selecting prime numbers up to a given upper bound. In FORTH it looks like this:

```
D ( Sieve of Erasthotes, modified from PC-FORTH demo file )
1 :PRIME
2   DUP 2/ 1+ SWAP .. Starting .. CR
3   1 DO
4     DUP 1 1 ROT
5     2 DO
6       DROP DUP 1 /MOD
7       DUP 0 = IF DROP DROP 1 LEAVE
8     ELSE
9       1 = IF DROP 1
10    ELSE
11    DUP 0 > IF DROP 1
12    ELSE
13    0 = IF 0 LEAVE ENDF
14    ENDF
15  ENDF
16  ENDF
17  LOOP
18  IF 4 . R ELSE DROP ENDF
19  LOOP
20  DROP 7 EMIT CR ..Finished .. ;
```

FORTH uses parentheses to delimit comments. :PRIME tells it that everything following up to the next semicolon should be compiled into the definition of a new FORTH word called PRIME.

DUP brings us to FORTH's major peculiarity, the stack. Imagine a well holding a spring-loaded stack of plates, each with one number written on it. You can pop a plate off the top (revealing the number on the next one down) or you can push a new plate with some number on it onto the top (hiding the previous top number), but you can't get at the submerged ones below the top.

FORTH's stack works like this: A number is interpreted as a command to push itself onto the stack, and DUP is a primitive that duplicates the top-of-stack (TOS in FORTH jargon). Thus, if we type 23 PRIME to FORTH, after DUP the stack holds | 23 | 23 |.

The number 2 pushes itself onto the stack, leaving | 2 | 23 | 23 |. The slash is FORTH's division primitive: it eats the top two numbers on the stack and pushes their quotient, leaving | 11.5 | 23 | 1+ simply increments the TOS, leaving | 12.5 | 23 |. SWAP switches the TOS with the second-of-stack (called 2OS) leaving | 23 | 12.5 |; point-quote causes characters up to the next double-quote to be output, and CR outputs a carriage return.

DO...LOOP is a FORTH control structure resembling the FOR...NEXT in conventional languages. The number 1 before it on the outer loop pushes itself, then gets eaten by DO to serve as a lower limit for the loop variable; then the 23 gets eaten to serve as an upper limit. The stack is now | 12.5 |.



It is a word that pushes the value of the innermost current loop counter (let's call it P). I 1 ROT pushes P and 1, then rotates the top three stack entries, leaving behind a stack state of | 12.5 | 1 | P |. This loop executes once for each number to be tested.

The inner DO uses 2 as a lower limit and 12.5 as an upper, leaving a state of | 1 | P |. DROP DUP leaves | P | P |. I pushes the current inner loop counter (the correct try at a divisor); let's call it Q. /MOD pushes the remainder and signed quotient onto the stack, leaving | P MOD Q | P/Q | P |. DUP replicates P MOD Q.

The code 0= IF DROP DROP 1 LEAVE tests P MOD Q to see if it's zero; if so, the stack is popped twice, a 1 is pushed, and the inner loop is left (a divisor has been found so P is non-prime).

If the remainder is not zero, the ELSE branch gets taken; the interpretation of the rest of that IF..THEN..ELSE is left as an exercise to the reader. The IF 4 .R ELSE DROP ENDIF prints the number being tested in a 4-character field if prime, else discards it, and the DROP 7 EMIT CR ." Finished " does a beep, a carriage return, and prints a termination message.

PC-FORTH, in fact, developed from an ancestor called figFORTH, the creation of a cabal of gifted and zealous partisans called the FORTH Interest Group. They produced a family of good, nearly compatible FORTH versions for a number of popular microprocessors including the 6502, 8080, and Z80 chips, as well as the 8086/8088 pair.

### How TILs Work

Threaded interpretive languages operate by simulating a "virtual machine"; they replace hardware instruction sets with higher-level primitives, which are instructions to the imaginary machine simulated in software. By this maneuver, many dependencies on the architecture of a particular microprocessor are eliminated. The nucleus of primitives and a tiny interpreter for them gets written in each processor's machine code, but most of the code in a TIL is then written in the TIL itself. FORTH is the most well known and one of the oldest of the TILs.

The FORTH virtual machine defined by its primitives is often very different from the real machine it runs on, such as the 8088 chip. FORTH's machine has no internal registers for data and memory addresses; instead data is passed around on stacks (see box). It has "virtual memory," which means that it considers both memory cells and disk storage together as a very large memory with average access

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**THOSE  
exposed to FORTH are  
polarized into either  
zealous partisans or  
vehement opponents.**

time slower than the former but faster than the latter. The primitives are much more powerful than machine instructions for the 8088 in that a single instruction can cause processing actions of greater complexity or subtlety, but because of the software "overhead" inherent in FORTH's design, they run somewhat slower.

Above and beyond FORTH's built-in primitives, or words, you can define your own. Your user-defined words—composites of words already defined in the lan-



guage—amount to mini-programs written for the virtual FORTH machine. Once they are defined FORTH can't tell them from its own predefined composites, and

## **F**ORTH will do nicely if you have reached the limits of what BASIC can do.

you can modify FORTH's initialization to include them. Even the FORTH machine's word interpreter can be changed; thus, not only can you write programs in FORTH, you can even gradually customize FORTH itself for your needs. And the customization becomes portable to other machines.

### PC-FORTH in Particular

The PC-FORTH manual and two disks come in unpretentious but austere classy packaging that will appeal to hobbyists and technical people. The documentation suggests the same attitude; it's carefully written, concise, and informative, but too short on tutorial material and examples for users with no prior programming experience. Also, no unifying overview of the system was offered to tie the painstaking documentation of individual pieces together (this will be remedied soon; the developer has shown me a draft of a FORTH overview they plan to include with the package).

Despite these problems I found learning the facilities relatively painless. A useful quick-reference card is included. A number of excellent demonstration programs (including a couple of enjoyable games) and systems tools including three editors, a stack tracer, an assembler, and a decompiler are provided. More advanced programming tools will be released in the near future as well as some additions to the documentation. Regular system updates and enhancements will be sent gratis to registered users, an enlightened policy I wish more developers would follow.

Eric Raymond is a freelance journalist and computer programmer based in Philadelphia.

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### Choice A - The Book, IBM Personal Computer: An Introduction to Programming and Applications Larry Joel Goldstein and Martin Goldstein

Now for the first time, here's a book specifically designed for novices, potential buyers, and existing owners of the IBM Personal Computer. You'll enjoy its thorough yet refreshingly informal approach to BASIC programming and applications. Contains all the information you'll need to know—from turning on your PC to programming it to using it for business and personal pleasure. Available in soft and hardcover. 1982/302pp/softcover/ISBN 0-89303-111-9/Prod. No. 9429/\$14.95

### Choice B - The Kit, IBM Personal Computer BASIC Programming Kit

Developed by the same authors, the Kit contains the IBM Personal Computer text—plus—an accompanying diskette of applications programs with complete documentation. The diskette saves time and eliminates frustrating keyboard mistakes. Designed for easy use, the Kit allows you to use, modify, and examine application programs at your own pace. Includes 37 actual application programs from the text, such as word processing, several interactive games, and much more. 1982/Prod. No. 9645/\$34.95

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"Hello?" "Yea, this is Steve from the Sears Business Center. I wanted to let you know that the IBM Personal Computer Technical Reference Manual arrived today. Since your name was on the waiting list, I thought I would give you a call."

"Great!" I said. "I'll be over to pick it up tomorrow afternoon."

"Well, I would suggest you come right now," said Steve. "You see, the manuals are going like hot cakes..."

The salesman was not fooling. When I arrived at the store, there were others ahead of me, each one plopping down \$52.49 (\$49.99 plus tax) for a fresh new copy of the manual. I noted with interest that one of the fellows purchasing the manual was the president of a company that designs interfaces for minicomputers. I wonder what was on his mind...

Arriving at home, I quickly removed the protective wrapping from the manual. As with all of IBM's Personal Computer documentation, the manual is packaged in the familiar "book and binder" scheme. As I removed the manual from its binder, as I could feel the excitement building, as if I were about to go on an exciting journey, a journey in which the "treasure" would be the valuable secrets of how the IBM Personal Computer operates. Glancing at the clock, I noticed it was early in the evening; the next time I looked at the clock, it was early in the morning!

The manual is packed with useful information. After the preface, an extensive table of contents, figure listing and table listing, the manual begins with Section One, "Hardware Overview." This section reviews each component of the computer. All information in this section is brief, just enough to arouse your interest. The section ends with a "System Block Diagram,"

which shows the various options available with the personal computer.

Section Two, "Hardware," begins with a discussion of the main system board, briefly covering each module of importance. Included is something called a "System Board Data Flow" diagram, which shows in detail how all the components on the main system board are connected.

The section then covers the bus signals available on the five card slots on the main system board. Interestingly, IBM refers to the five slots as the I/O (Input/output) Channel, a term that is familiar to IBM's mainframe customers. All 62 pins of the I/O Channel are defined with a signal name and description. Also included is a diagram showing the locations of the major components on the main system board.

The next discussion is about the keyboard. The keyboard has some interesting features, including an Intel 8048 single-chip microprocessor. After reading about the keyboard and its "scan codes," I wondered who would be the first to connect a "musical" keyboard to the IBM PC.

The cassette interface and the speaker interface are covered next. The I/O Address Map and the System Memory Map

**YOU SEE,  
the manuals are going  
like hotcakes...**

are then introduced. The most striking feature of the Memory Map is all the unused space—waiting for system expansion. Also included is a discussion of the various switches and their settings on the main system board. Finally, the power supply is discussed, including the power supply connectors and pin assignments.

The remaining topics in Section Two deal with the I/O Channel boards.

First on the list is the IBM Monochrome Display and Parallel Printer

Adapter. A discussion of the overall features are presented, including a block diagram. Next, the specifics are covered: signals and loads on the I/O Channel, data rates, interrupt, and DMA response. Information vital to the programmer is also included: modes of operation, programming considerations, memory requirements, and the I/O address and bit map. Specifications of the IBM Monochrome Display are also listed.

The Color/Graphics Monitor Adapter is discussed next, again with the same depth and detail. Next is a discussion of the Parallel Printer Adapter and the IBM 80 CPS Matrix Printer. The 5¼-inch disk-drive adapter, drive and diskettes are discussed. In addition, memory expansion options and the Game Control Adapter are covered. The section ends with a detailed discussion of the Asynchronous Communications Adapter.

Section Three, "ROM and System Usage," is a software developer's dream come true. The most important information here is a discussion of the ROM (read only memory) BIOS (basic input/output system). Parameter passing and interrupts are covered. The information on the interrupt vectors is especially complete, including both discussions and listings. Other topics covered include cassette logic, keyboard encoding, and detailed memory maps. In short, if you plan to write systems software for the PC, this section, combined with Section Two, will save you many hours of "searching through the ROMs."

The manual ends with many useful appendices. Appendix A, "ROM BIOS Listing," is a complete, thoroughly commented source listing of the BIOS. That's right, no more disassembling ROMs to decode the I/O routines; they are already listed for you.

Appendix B, "Assembly Instruction Set Reference," contains both a model of the 8088 registers and a listing of its instructions and op codes. However, no descriptions of the instructions are given, so Intel's IAPX 88 Book (or equivalent)



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may be necessary if you are not familiar with 8088 assembly language programming.

Appendix C, "Of Characters Key-strokes and Color," contains an assortment of tables listing various symbols, keys, and characters with their corresponding hex and decimal codes.

Appendix D contains the complete schematic diagrams for the circuitry of the Personal Computer. This includes schematics for the system board and the plug-in boards now available from IBM. Those interested in computer hardware will have hours and hours of enjoyment studying the schematics.

The manual concludes with Appendix E, "Unit Specifications," a glossary, a bibliography, and an index. That's right, an index, something new to us microcomputer users. Finally, in typical IBM fashion, a product comment form is included. This allows you to comment on the manual and/or offer suggestions for improvement.


Obviously, the IBM Personal Computer Technical Reference Manual is packed full of useful information. However, I have heard a few complaints.

For example, although the bus signals are defined, computer hardware engineers point out the absence of any timing diagrams. (A bus timing diagram or "bus spec" defines the best and worst case times allowed for bus signals.) Even so, absence of such information does not seem to have impeded development of products for the Apple II computer, and I doubt that it will for the Personal Computer. Also absent from the manual are parts lists and diagrams showing the exact locations of components on the printed circuit boards. And yes, there are the usual typos, but that is to be expected in a first edition—even in the "computer age."

I am very much impressed with the IBM Personal Computer Technical Reference Manual. It is mandatory reading for anyone wishing to work intimately with the PC's extensive hardware and software features. This manual could even serve as an excellent textbook at the college level. Just imagine the student response to a computer engineering or computer science course called "The IBM Personal Computer—Hardware, Software, Applications."

Norman McEntire works with Micromon Productions in Dallas.





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LES COWAN

## Book Briefs

### Lay Of The Word-Processing Land

Introduction To Word Processing

Hal Glatzer; Sybex

205 pages; \$12.95

Hal Glatzer is a journalist first and a technical type second. He has thoroughly explored the world of word-processing and mapped it out in clear, clean prose. Introduction To Word Processing is comforting to the eye, simply illustrated with photographs and uncluttered diagrams. In general, Glatzer avoids descriptions of particular systems; you won't find an analysis of WordStar here, for example. Rather than describe individual towns on this map, he is concerned with the lay of the land, tells you what lies in each direction, explains the difference between a large city and a hamlet, gives you a good compass, and leaves you prepared to do more detailed research on your own.

Thus chapter five, entitled "Which Type of Word Processor is Best," climbs from a concise explanation of the workings of electric typewriters with one-line editing and mag-card storage through similar treatments of dedicated word-processors, micros, minis, and mainframes. From the vantage point reached by the end of the chapter, Glatzer points out the pros and cons of each type of system, depending on the user's needs, and offers suggestions for benchmark comparisons.

Other chapters provide similarly informative overviews of the history of word-processing, the kinds of printers available, cost-effectiveness of word-processing, the various functions of word-processors, e.g., insertions, deletions, lexicons, global search, and more.

Introduction To Word Processing has 12 chapters in all plus a good index, a helpful glossary, and what is most welcome, an 11-page bibliography.

### You Don't Own What's In Your Head

Trode Secrets

James Pooley; OSBORNE/McGraw-Hill

213 pages plus appendices; \$19.95

James Pooley is an attorney who wrote Trode Secrets as a guide to help both employees and employers avoid disputes over "proprietary information."

Trode Secrets is divided into six chapters followed by nine appendices, each an example of a letter or document, e.g., a typical confidentiality agreement.

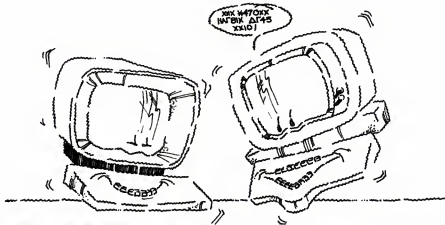
The book begins by defining proprietary information as "commercially useful ideas." Proprietary information may be a technological breakthrough or a list of customers. The point is that it is an asset and must be protected as such. But first it must be identified. Throughout the book Pooley emphasizes the importance of a firm's keeping a detailed inventory of its proprietary information.

The second major theme of Pooley's book is that appearances are at least as important as fact in deciding trade secrets cases, should they go to trial. According to Pooley, a history of stern warnings to employees concerning the seriousness of secrecy weighs as heavily with judge or jury as the value of the secret itself. If you act as if your secrets are worth keeping, the judge may be sufficiently impressed simply by your earnestness to grant the injunction you want.

Pooley's third major theme is that trade secrets law is relatively new, especially as it applies to rapidly changing technologies, i.e., electronics. Furthermore, many judges and juries do not understand the technologies involved. According to Pooley, judgments are often subjective, based on a judge's biases or even his mood that day. And each judgment is unique to the individual case. No reliable body of precedence has accumulated to guide judges. The upshot is that a trade secrets case is a risky proposition, as well as an expensive one.



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EDITED BY KATHLEEN BURTON

# Club News

*New clubs springing up the land (like crocuses).*

PC has received word of five new clubs in the United States and Canada:

**Indianapolis:** Jo Spangler, IBM PC Users Club, Microbase Software, Inc., P.O. Box 40353, Indianapolis, IN 46240 [317/877-4304]. **Northern New Jersey:** Irving Lang, 7 W. 45th St., New York, NY 10036 [212/581-2909]. **Ontario, Canada:** Tony Bagshaw, P.O. Box 1378, Station B, Downsview, Ontario, Canada M3H 5V8. **Son Francisco Bay Area:** Christian Du Lac, Box 155, San Francisco, CA 94101 [415/668-4647]. **Suffolk County, New York:** Marvin Freifeld, P.O. Box 77, Smithtown, NY 11787 [516/724-0574].

## Ongoing Clubs

PC has learned from various subscribers that several new clubs have already begun meeting. (Bet there are more acronyms in this section than you can translate.)

**Baltimore, Maryland:** Future meetings of the Baltimore PC will be held temporarily on the first Tuesday of each month at ComputerLand, 1516 York Rd., Lutherville, MD. Membership is \$5. A club newsletter, the I/O News is published monthly.

**Penn State:** The Microcomputer user Group #18, better known as MUG, will meet regularly with scheduled lectures. For information, contact Penn State University, 215B Computer Bldg., University Park, PA 16802.

**Santa Barbara, California:** The Santa Barbara Computer Club for IBM PC users would like to affiliate with other user groups. Contact Stu Swartz, Santa Barbara Community College, Computer Sciences Dept., 721 Cliff Dr., Santa Barbara, CA 93109 [805/966-2919].

**Stamford, Connecticut:** Meetings are held every third Tuesday of the month at ComputerLand, 111 High Ridge, Stamford. Future agendas will include matching users of similar interests. Contact Dave Foulger, 69 River St., New Canaan, CT 06840.

## Bulletin Board

For technical information call the BBS, 3277 Victor Circle, Annandale, VA 22003 (703/560-0979). This bulletin board is open 24 hours a day, 7 days a week, and will take messages and disseminate information bulletins.

## Autumn Revolution '81 Update

Autumn Revolution '81 is an independent users' group for the IBM PC headquartered in Tulsa, Oklahoma. Organizer Dan Perry has informed PC that membership is burgeoning, and a toll-free "technical hotline" is now open. For \$1 per minute (\$5 minimum), members can call and receive user information from a qualified technical person.

Membership will be accepted over the hotline, with fees of \$30 for one year, \$55 for two years, and \$80 for three years. Besides use of the hotline, membership includes a subscription to the newsletter, access to software and technical libraries, and user training. Contact Autumn Revolution '81, P.O. Box 55329, Tulsa, OK 74155. Hotline number: (800/331-2347).

## (Good) Deals

Starware is offering substantial discounts to members of IBM PC user groups on WordStar, Maxwell Diskettes, Houston Instruments Supplies, and Tall Grass Technologies [202/337-5300].

## Consider the Source

PC has learned that an IBM PC Cozette is now on The Source. To leave messages, call SMAIL TCS668. (To read the Cozette, enter PUBLIC from COMMAND level, Select OPTION 1, and at COMMAND level, enter POST READ IBM.)

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# Walking Through The Open Door

Frederick Merchant, program creator, and Bob McCullough and associates.

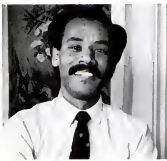
IBM's welcoming of all comers to make products for the Personal Computer has spawned a great deal of invention, both frantic and leisurely. Many of the programmers and hardware manufacturers who've entered this booming business have announced or actually delivered their products; many others are hinting broadly or coyly declining to comment. One result of all this hoopla has been a rumor mill that may perpetually outstrip the real developments in both quantity and quality.

Two of the vanguard in preparing software and hardware products for the IBM PC have delivered known quantities, however. They are Frederick Merchant, whose Personal Moller is a powerful program that handles names and addresses in numerous ways, and Dr. Robert McCullough and his associates at Datamac Computer Systems, whose peripherals for the PC include memory and communications boards and expanded disk storage. These small-scale entrepreneurs are among the pioneers who have brought their products to market within a few months of anyone's having a PC to work with.

## A Specialized Data Base

Fred Merchant calls his Personal Moller a "specialized data base." This description is appropriate, because the program has the sorting and data manipulation features of many data base programs, though it is limited to the name-and-address format. One excellent feature of Personal Moller (PM) is its built-in utilities, which allow the user to transfer an existing name-and-address file to the PM file format or to make any PM file into a plain file readily accessible through the Personal Computer's disk operating system (PC-DOS). This flexibility means that anyone can take files created with some other program and use PM's features on them or transfer a PM file to PC-DOS form for use with a word-processor or other program.

In addition, Merchant's program, written in the BASIC language, contains sort and search features and coding and com-



Frederick Merchant

**I'D HATE  
to design something,  
push it out there, and  
have nobody want to  
use it.**

ment sections in each record, which make it desirable for small-business mailing lists as well as personal name-and-address files. Each record has 11 sections (usually called fields), including last name, first name, an optional line for company name or title, street, city, state, zip code, home and work phone numbers, and the code and comment lines. The length of each of these fields can be varied, with a maximum of 36 characters in any field. Each record is automatically assigned a number, and Merchant has also taken advantage of the PC's "date" utility to date each record when it is entered or revised.

Versatile editing and printing controls allow users to change the format of files or update individual records easily, and each file can be protected with a password. All aspects of PM are well documented with on-screen menus, and the program is straightforward in organization. In short, Personal Moller promises to be a highly useful program for PC owners, and its preliminary price of "less than \$100" should

make it affordable for a wide spectrum of businesses and individuals. Initially, Merchant plans to distribute the program through his firm, Computer Age of San Francisco.

## Spare-Time Programmer

Fred Merchant estimates that development and in-house (alpha) testing of Personal Moller took him about 250 hours, spread over some three months. He managed to find 20 hours per week for work on the program, which is definitely a secondary career interest for him. His first obligation, and his ultimate profession, is medicine; Fred is currently beginning his third year of medical school at the University of California.

Merchant began his computing career several years ago with one of the early Apple IIs. Interest in medical work was paramount in his first programming effort for the Apple, he recalls. "I got one of the first disk drives and sat down to write a program which I thought could be used in a physician's office for patient recall." The main component of the program was a name-and-address file, which a doctor could use to send reminders to patients who must return for regular checks of their medical status.

"The program evolved over a period of years," Merchant notes. "to become a mailing-list program for an Apple users' group in Seattle, where I lived at the time, and now it's used by many Apple users' groups all over the country." This program, named Apmoil, was what Fred calls a "first-generation" type of mailing-list handler. His new Personal Moller has features that he developed from feedback to Apmoil and from his own experience in programming and computing. (Continued)

Would you or someone you know be a good subject for a PC Profile? PC welcomes suggestions for people to be featured in this series—anyone whose use of an IBM Personal Computer would prove interesting or helpful to readers. Send your recommendations to PC Profiles, 1528 Irving St., San Francisco, CA 94122.



Merchant chose the PC to begin his work on a new generation of program. "When the PC became available, it had a lot of power to do a lot of different things, so I wanted to tap that power and try to go into what I call the second- or third-generation type of program. This means it's a lot more user friendly, has a lot more flexibility and portability of files, and is expandable."

Because he had written and refined the Apmoil program, Fred expected merely to adapt that as the basis for Personal Mailer. "I thought it would be easy; I would just slightly redo what I'd done on the Apple for the PC. But things never work that way. Personal Mailer is actually a completely rewritten code. It has no resemblance at all to the first-generation mailing program on the Apple."

#### Thinking on the Bus

The bus plays a part in Merchant's program development, but it's not the cabinet for circuit boards in a computer—it's the city's transportation vehicle. "I'm not so organized that I write everything on a nice,

concise flow chart, but I like to take notes. I may be on the bus going downtown or to school or whatever, and an idea will pop into my mind; I'll just jot down something.

## WE TOOK the cover off and looked at everything.

Later that will trigger my mind as I'm working on the program." Even when he's at the keyboard, Merchant points out, "I'm not one of the programmers who turns on the PC and starts typing. I have to have an outline or concept of how it's going to be done, usually in some sort of modular fashion."

He also makes use of techniques and information that other programmers have developed. For example, in Personal Mailer he used an adaptation of the "soundex algorithm," a formula that identifies words or names that sound alike.

such as Peterson and Petersen. "I try not to invent the wheel any more than I have to," Merchant observes.

So far Fred Merchant's PC time has been devoted to his mailing-list program, but he expects to keep learning and developing programs for his own use in medical practice and for general use, as well. "I'm very much interested in medical information science—how you can incorporate computers into the medical environment in a friendly sort of way, so that neither the physician nor the patient is apprehensive about using them. I see that as a wave of the future."

Merchant offers one bit of advice to other PC users who are developing programs for themselves or for commercial use. "Become familiar with your machine; learn its capabilities—what it can and cannot do. This necessitates a careful perusal of all the documentation that goes with the PC so that you really get to know it. If you know all the things it can do, you're in a better position to sit down with the computer and come up with a program that you might want to develop."

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## A Home for Hardware

Becoming familiar with the PC is exactly what the staff members of Datamac Computer Systems were doing when they decided to build a memory board for the new IBM computer. Vice President of Sales Bob Lindgren recalls the firm's original interest in the PC: "Back about the first of October, we looked closely at the IBM announcement, just for our own internal analysis and review, because we have a computer that we market. And we noticed some deficiencies in the IBM product line—the most obvious was the memory."

Computer memory products are nothing new to the Datamac staff. The company's president, Dr. Bob McCullough, was the designer of the first add-on memory for the IBM System/360 and 370 (at an earlier point in his career and when working for another firm), and the other five principals at Datamac have extensive experience in the computer field. So the group knew it could meet the technical challenge of making memory components for the PC; its first concern was with marketing the products if Datamac were to

make them.

After talking with people at the corporate headquarters of ComputerLand and determining that the chain's stores could sell products for the PC that were not made by IBM, Bob Lindgren notes that the Datamac crew began to think seriously about making PC memory boards. "Then we thought about how we could do it, technically," Lindgren says. "So Dr. Bob and I went to a ComputerLand store that had a

**I** WANTED  
to tap the PC's power  
and go into a second-  
or third-generation  
type of program.

PC and looked at the system. We took the cover off and looked at everything. We also got our hands on the technical manual before that was out officially."

Although they didn't have a PC in house yet, the group held a product planning session based on their knowledge of general computer technology, the information in the technical manual, and observations from a peek inside the machine. The session ended with a tentative decision to make memory boards for the PC.

"Dr. Bob went away on a Friday and came back on a Monday with the schematics and everything done," Lindgren remembers. Adds McCullough: "I've had a little practice."

## Suddenly a New Division

Bob McCullough had spent a weekend designing the memory board, thereby creating the first offering for his firm's new Peripheral Products Division. Previously Datamac had concentrated on marketing its own microcomputer and planning for another, more powerful micro to add to the product line.

Once the new product's design was worked out, the Datamac staff put together a working board to show ComputerLand

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headquarters. Concurrently, they sent out announcements of their expandable PC memory boards—available in configurations of 64K, 128K, 192K, or 256K—to individual ComputerLand stores. The response was immediate.

"The day after we mailed out our announcement, we started getting calls with orders for 10 or 20 boards or whatever," Lindgren states. "Then we knew that we really had to start producing."

McCullough recalls that they had not anticipated such an immediate or large demand. "For the first two months we were production-limited. Primarily, ComputerLand stores were selling the board with the computer as it was being sold, as opposed to the computer going out with the end user and then the end user deciding to get a board."

In recent months, Datamac's production and testing facilities have been able to keep up with demand, which consists of orders from individual ComputerLand stores and the corporate division, and from consumers who do not have a retail outlet handy. Lindgren estimates that the firm has sold more than 2,000 memory

boards for the PC since late 1981.

### Disks and Communications

Datamac's success in selling its memory boards has led to other products for the PC. One of these is a 5¼-inch Winchester hard disk that fits into one of the PC's disk-drive slots; it is available with 6, 12, or 18 megabytes of storage. The hard disk can be used in combination with a floppy disk drive in the other disk slot, and the necessary controller board and cables also fit inside the computer's cabinet. Because the hard disk requires its own power supply, however, a small, thin power unit is attached to the back of the PC cabinet for this purpose.

Dick Andreini, vice president for marketing, points out that this outside power supply requires no modification of the PC's cabinet. "As a matter of fact, there happen to be four screw holes of unknown origin on the back of the PC in that very location. We use those to attach the power supply, so we're not modifying the back of the system or drilling any holes."

Two additional products are in the works for the PC at Datamac. One is soft-

ware designed to expand disk storage by allowing use of both sides of the disk; this must be used with double-sided drives. The other new development is a communications board, which has the option of a second line, so that a modem and another device, such as a printer, may be used simultaneously.

Bob McCullough is confident that his firm will continue to design and manufacture hardware for the PC, but he is reluctant to predict what those products will be. "The products we make in the future for the PC are going to be primarily market-driven. As an engineer, I hate to design something and push it out there and have nobody want to use it. We're in business to supply things that people need and want. We don't want to get into an engineering sandbox."

For further information:

Frederick Merchant, Computer Age of San Francisco, 825 Moscone Ave. #6, San Francisco, CA 94117 (415/921-7792).  
Dotomoc Peripheral Products Division, 680 Almonor Ave., Sunnyvale, CA 94086 (408/735-0323).



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# User-To-User

Shared discoveries and questions about IBM personal computers.

## An Invitation to Share...

This regular "User-To-User" department will pass along field-tested innovations, tips, caveats, and questions concerning IBM Personal Computers, contributed by PC readers. Already there has been a wellspring of insights, a few gripes, and some unanswered questions flooding our mailbox. We have inaugurated this department as a place to share them.

Before sampling this month's offerings, a word might be in order regarding the "philosophy" of this department. We recognize that computer users, like automobile owners, have different involvements with their machines. Some are content knowing how to change a tire or learning how to drive in snow. Others might want to play with adjusting the carburetor. A few might even get down to the grimy business of rebuilding the differential. (At least with computers you don't need a set of Allen wrenches, and you can forget the Baraxa.)

We'll try to serve all interests in this space, but we will avoid purely theoretical discourse. We simply want to pass along whatever makes the little beast work better. If the going gets seemingly technical, don't be put off—better yet, stick with us. Anyone can (and should) learn to change a tire.

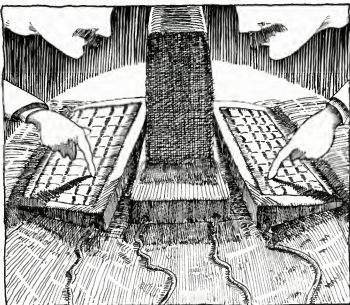
## Disk Speedup

The undisputed celebrity of this month's user tips is SPEEDUP—14 lines of BASIC program code that will make your disk drives perform their chores in half the time. The program popped up in Wes Marchant's Annandale, Virginia IBM Bulletin Board Service (see Club News). It was sent there by Chris Carson of Aurora, Colorado, who found the program circulating in the Denver area, where it evidently originated from the Apparat store there. Good news travels fast. Here it is:

```

05 REM SPEEDUP DISK-ZIP
10 FOR I=1 TO 37: READ N: C=C+N
15 NEXT: READ N: IF N<>C THEN 40

```



```

20 RESTORE: OPEN "R": 1, "SPEEDUP.COM": 1
25 FIELD 1,1 AS NS: FOR I=1 TO 37
30 READ N: LSET NS=CHR$(N): PUT 1
35 NEXT: CLOSE: PRINT "Created": END
40 PRINT "** ERROR - Verify Data **": END
45 DATA 186,18,0,184,30,37,205,33,139
50 DATA 250,190,26,1,185,11,0,243,164
55 DATA 51,192,205,19,139,215,205,39
60 DATA 223,2,37,2,8,42,255,80,246,0,4
65 DATA 3866
70 END

```

Even if you've never touched BASIC, this gem is too good to pass up. To create the program, place the PC-DOS disk into your A: drive and load BASIC by typing BASIC and hitting ENTER. Then type each of the lines above, exactly as written. Hit ENTER after each line. When you've hit ENTER following line 70, hit the F2 key to run this short program.

If you get a message saying **\*\* ERROR - Verify Data \*\*** then you've made a mistake

copying the numbers in lines 45 through 60. Otherwise, you will have created a new file on your PC-DOS disk called SPEEDUP.COM.

Go back into PC-DOS by typing system and ENTER and run the new program by typing speedup and ENTER. Now load and run any program or PC-DOS utility and be amazed. Your disk drives will miraculously zip along at almost double speed, singing instead of groaning.

Exactly how much faster? Well, for example, to format a new disk with the /s option: 25 seconds instead of 45 seconds. To copy the PC-DOS disk via the "DISK-COPY" command: 42 seconds instead of 83. To copy the entire PC-DOS disk with COPY \*: 139 seconds instead of 206. If you're a speed and performance fanatic (who isn't?), you've just made up to a 100 percent improvement in your disk operations.

According to Chris Carson, the pro-



gram works its magic by reloading the diskette parameters table in PC-DOS. IBM programmed the step rate for the machine's Tandon disk drives at eight milliseconds; **SPEEDUP** shortens this to six, still within the Tandon-rated minimum of five milliseconds. The program also sets the head settle rate to zero milliseconds, which is the Tandon minimum rating. (IBM's conservative default setting is 25.)

The obvious question: Will this routine send smoke out of your drives or garble your prized data? I can only report that Chris and his Denver-area friends have been using **SPEEDUP** regularly for several months with no reported ill effects or glitches, and that I've become a total **SPEEDUP** convert. Nevertheless, it should be made clear that neither Mr. Carson, I nor PC magazine warrant this modification. You undertake it entirely at your own risk and, we hope, to your delight.

Note: If you load and run a program by hitting **Ctrl-Alt-Del** (as you do with Easy-Writer and VisiCalc), the system will reset, and **SPEEDUP** will no longer be in effect. Once you've run **SPEEDUP** and see the PC-DOS **A>** prompt, insert your program disk in drive A: and type command and **ENTER**. Your program will load and run its disk activity in about half the time. You can also include **speedup** as the first instruction in a disk's **AUTOEXEC.BAT** file (PC-DOS manual, pages 2-16)—provided, of course, that you copied the **SPEEDUP.COM** file to that disk.

## Bug Hunt

Now for the bad news. A number of unnerving reports have surfaced that cast doubt on the ability of IBM Personal Computer BASIC (version D1.00) to calculate and reason correctly. The bug that got the most publicity was reported by Andrew Pollack in the April 5 New York Times. It seems that BASIC can't always divide .1 by 10 and come up with the right answer.

## IBM Debugs BASIC

IBM has corrected the BASIC bugs. BASIC 1.05 is now available from IBM dealers.

We contacted David Walonick of Minneapolis, the purported discoverer of the bug, and he provided this test program:

```
5 'Basictst.100
10 DEFDBL A 'defines A as double precision
20 READ A
30 PRINT "A = "; A
40 PRINT "A = "; : PRINT USING
   ".***"; A
50 PRINT "A divided by ten = "; A/10
60 PRINT "A divided by ten = "; :
   PRINT USING ".***"; A/10
70 END
80 DATA .1

RUN
A = .1
A divided by ten = .001
A divided by ten = .010
```

Line 20 reads the value .1 into variable A. Line 30 prints A via the normal **PRINT** statement and line 40 prints A with **PRINT USING**. So far so good. But in line 50 we try to print the value of A divided by 10. The answer should be .01—not .001 as the

```
70 END

RUN
A = .1000000014901161
A = .100
A divided by ten = 1.0000000149011610-02
A divided by ten = .010
```

The math is accurate this time, although you do get meaningless digits after eight places if you use **PRINT** instead of **PRINT USING**. (The math bug will crop up, however, if you use **INPUT** to get a value for A.)

David Walonick has been asked by IBM to go down to Boca Raton to help smoke out the extent of the problem. Meanwhile, the best advice we can offer is to be very careful using double precision numbers, and experiment to see whether various methods of input or output avoid errors.

This bug led me to experiment further with the way BASIC treats double precision numbers, and I chanced upon more traps awaiting hapless number crunchers. Consider **Basictst.200**:

```
[ENTERED AS]
5 'Basictst.200
10 DEFDBL A 'defines A as double precision
20 A = .00000001
30 PRINT "A = "; A
40 PRINT "A = "; : PRINT USING
   ".*****"; A
50 END
```

```
LIST
5 'Basictst.200
10 DEFDBL A 'defines A as double precision
20 A = 1E-08
30 PRINT "A = "; A
40 PRINT "A = "; : PRINT USING
   ".*****"; A
50 END

RUN
9.99999993225290-09
A = .00000001
```

The first listing shows the program as I entered it on the screen. Since A is an eight-digit number, it is properly double precision. When you list the program, however, A has been converted into exponential form. (Note, however, that the designation **E** is used instead of **D**, as pages 3-11 of the BASIC manual would lead us to expect.) When we want to display the val-

**W<sub>E</sub>**  
*shouldn't let the PC's  
forgiving attitude  
about lower case lull  
us into complacency.*

program run indicates.

The problem is evidently with the output rather than the calculation, since printing the value of A/10 with **PRINT USING** does produce the correct result. Also, the bug seems to occur only when double-precision (more than seven-digit) numbers are involved.

My fooling around with this bug disclosed that the problem is not as severe if you assign a value to A directly, as in **Basictst.101**:

```
5 'Basictst.101
10 DEFDBL A 'defines A as double precision
20 A = .1
30 PRINT "A = "; A
40 PRINT "A = "; : PRINT USING
   ".***"; A
50 PRINT "A divided by ten = "; A/10
60 PRINT "A divided by ten = "; :PRINT
   USING ".***"; A/10
```



ue of A, the PRINT USING statement is, once again, the only way to avoid meaningless output.

Are you ready now to send your machine into a nosedive? Delete line 10 from the program above. Even without the definition statement, BASIC should make A a double precision number. When we run the modified program, however, the existence of the PRINT USING statement evidently throws the program into a hopeless crash. (The only recovery is a cold start.)

We've saved the most bizarre bug for

last. Notice of it came to us from two sources, Chris Kantack of Belle Plaine, Iowa, and Alex C. Seggie of Freeton, Ontario. If you've got your machine up and running again, you can amuse and confound yourself by running Basicst3.00:

```
LIST
5 ' Basicst3.00
10 INPUT "B = "; B
20 PRINT "A = "; A
30 IF A = 0 THEN PRINT "A equals zero"
   ELSE PRINT "BUG !!!"
```

```
40 PRINT : GOTO 10
50 END
RUN
B=?
A=0
A equals zero
B=?
A=0
A equals zero
B=?
A=0
BUG!!!
```

## Resetting BASIC for Serial Printers

The following contribution from Dr. Willard A. Brown of Western Washington University might look frighteningly technical if you are new to computers, but it could help enormously if you have a serial-type (RS 232) printer you want to use with your PC. If you have such a printer but are not technically inclined, plunge on fearlessly anyhow: Type in Dr. Brown's two programs letter for letter without worrying what they mean, saving each to disk under the names shown. Then, at the start of every computer session in which you will use the BASIC language, load the disk with these two programs first. They will make your serial printer operate with all the convenience of IBM's standard parallel-type printer.

When I bought my IBM PC I intended to make use of the serial-interface daisy wheel terminal I already owned. Using the RS 232 port with the LIST 10, COM1:300,N,8,1 statement worked fine (as long as my terminal was set to the "auto line feed" option, and with the slight bug that it wouldn't print the final character in the file.) However, as I became more familiar with the system, I realized some nice features were not available, namely the PrtSc variants at both the BASIC and PC-DOS levels.

With the help of the IBM PC Technical Reference Manual, I developed the instructions that follow.

Listing 1 is an automatic-starting set of operating system instructions that makes the usual request for the date, then goes into BASIC to RUN a program, SETUP2, that acquires the computer to use the serial printer.

The instructions in the setup program:

- (1) Supply the needed parameters for opening and initializing the RS 232 port;
- (2) Establish the WIDTH for the RS 232 port;
- (3) Change the PC-DOS instructions that start at 60H so that the address for the parallel printer is made to point instead at the RS 232 port;
- (4) Let the hardware status information at 40:8H "lie" to the system concerning the presence of a parallel printer;
- (5) Insert a set-interrupts-enable-flag instruction at 100H;
- (6) Set register AH to 01H to indicate to the RS 232 subroutine

```
BASICA SETUP2
BASICA
Z
```

NOTE: To enter the character shown as "Z" in the listing above, type F6, then return.

### LISTING 2

```
SETUP2.BAS
10 OPEN "COM1:300,N,8,1" AS *1
20 WIDTH "COM1:" , 80
30 DEF SEG = &H0
40 POKE &H0, &H40 '00S PARALLEL PRINTER VECTOR CHANGE
50 POKE &HE, &H1
60 DEF SEG = &H40
70 POKE &H8, &HF8 'TELL BASIC THAT THERE IS A PRINTER
80 POKE &H9, &H3
90 DEF SEG = &H0: POKE &H100, &HF8 'RESTORE THE FLAGS
100 REM AN INCONSISTENCY EXISTS IN ROM BIOS CONCERNING
110 REM THE MEANING OF THE AH REGISTER IN THE RS 232
120 REM AND THE PARALLEL PRINTER PORT SUBROUTINES
130 REM THEREFORE THE FOLLOWING LINE
140 POKE &H101, &HB4: POKE &H102, &H1
150 REM THE NEXT THREE LINES SIMULATE THE 160 REM PRINTER PORT INTERRUPT VECTOR
170 POKE &H103, &HEA: POKE &H104, &H39
180 POKE &H105, &HE7: POKE &H106, &H0
190 POKE &H107, &HF0
200 REM NOW TELL THE INTERRUPT HANDLER TO JUMP
210 REM TO 100H FOR ITS NEW INSTRUCTION SEQUENCE
220 POKE &H5C, &H0: POKE &H5D, &H1
230 POKE &H5E, &H0: POKE &H5F, &H0
240 SYSTEM
```

**YOUR**  
serial printer will  
operate with all the  
convenience of IBM's  
parallel-type printer.

that a character is ready to be typed; (7) Branch to the RS 232 subroutine; (8) Change the interrupt vector at 5CH to point to the new instructions at 100H.

The reason for the somewhat convoluted auto-start routine is that BASIC doesn't sense that its entry parameters have been changed until it is reinvoked.

The two following programs also enable LIST and LPRINT in BASIC. And if you then use the SYSTEM command, the control-P option is enabled in PC-DOS.

—Dr. Willard A. Brown

### LISTING 1

```
AUTOEXEC.BAT
DATE
```



```

B=? 4
A= 0
A equals zero
B=? 5
A= 0
BUG !!!
B=? 6
A= 0
BUG !!!
B=? 7
A= 0
BUG !!!
B=? 8
A= 0
A equals zero
B=?

```

Since A is not assigned a value in the program, it should be initialized automatically to zero when the program is run. It is, in fact, and the "A=" results so indicate. But for some reason, the accuracy of the logic function in line 30 depends on the value input for B. Simply incredible!

"Aha, but there is a pattern there," you say. Notice that the logic works correctly

when B is equal to 1, 2, 4, and 8. Yes, it also works when B is 16, 32, 64, 128, and 256. But it also mysteriously works when B

***AND THEY ALL  
point to the fact that  
we shouldn't  
let the PC's forgiving  
attitude toward  
upper and lower case  
lull us into  
complacency.***

equals 257, and 512 through 515, and 1024 through 1032. We promised no theorizing, so we'll leave you (and the gang at Boca) to figure this one out.

(Interesting to note that this bug does not crop up if B is assigned its values in a

FOR-NEXT loop, or with a READ DATA table.)

Before moving on to more positive matters, a word regarding our editorial stance on glitches and bugs: We at PC do not get our thrills being critical of other people's hard work, and, Lord knows, people who have hacked their way developing their own software should be nothing but empathetic toward snafus. In an ideal computer world everything would work perfectly all the time—and we all know it never will. Our sole purpose is to warn users of unexpected pitfalls, do our best to document the bugs, and help their creators get them fixed.

(We have passed all this information on to IBM. Remedies may already be in the works by the time you read this.)

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If you are using the COMM.BAS program provided on the PC-DOS disk for "dumb terminal" access to networks and bulletin boards, there's a relatively easy fix that will get you a printout. Load the program and then enter and/or revise the following lines:

```
5 REM COMM.BAS Modification to provide
  simultaneous printout
295 IF LEN(B$)>1 THEN IF
  ASC(MID$(B$,2,1))=114 THEN IF
  PRN=FALSE THEN PRN=TRUE ELSE
  PRN=FALSE ' toggles print function
  with Control-PrtSc
405 IF PRN THEN LPRINT MID$(A$,1,1);
462 IF ERR=27 THEN BEEP:PRINT:PRINT
  " == CHECK PRINTER == "
  PRN=FALSE: RESUME 'error trapping for
  printer off or out of paper
463 RESUME
```

This modification will let you use the keyboard combination Control-PrtSc to toggle on and off the printer (make sure the printer is turned on).

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times.

all point to the fact that we shouldn't let the PC's forgiving attitude toward upper and lower case lull us into complacency. PC-DOS and BASIC usually don't care whether we converse with them in capital letters, but other machines and programs

often do. Witness: Bob Kay of Leading Edge Products, which distributes the C.Itoh Starwriter line, wrote to inform us that the Starwriter can produce sub- and superscripts with EasyWriter, contrary to what we reported in the February-March issue of PC. The Control-Q command must, however, be followed by an uppercase D or U.

One network novice (who requested that he remain nameless) couldn't get his Hayes Smartmodem to perform at all. After tearing his hair, pulling apart his PC's innards, and trucking his asynch' board and modem back to ComputerLand, he discovered that the Hayes modem, only understands uppercase. */PC*

## Share Your Discoveries

When you learn something from which your fellow PC users can benefit, pass it on through these pages. You'll encourage others to return the favor, plus we'll pay from \$25 to \$100 for each tip published. Mail contributions to: User-to-User, PC magazine, 1528 Irving St., San Francisco, CA 94122.

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# The Microsoft/Lifeboat Battle Cry

Software firms back PC-DOS as 16-bit standard.

Illustration: Suzanne Anderson

"In the beginning the technological world of man was null, void, and without form, and man said: 'Let there be Computers!' and lo there appeared hardware. And man said: 'Let there be life in these computers' and alas there was none. Man then said: 'Let there be software!' and lo, and behold there suddenly appeared life."

—Opening slide at Microsoft seminar

Two major players in the lucrative microcomputer software market, Microsoft and Lifeboat, have announced that they support IBM Personal Computer DOS (PC-DOS) as the "standard" operating system for 16-bit microcomputers.

Whether this amounts to if you are a CP/M-86 fan is an outright declaration of war by two companies that are probably just as responsible for CP/M's standardization on 8-bit microcomputers as Digital Research, CP/M's creator.

New York-based Lifeboat has published and marketed more CP/M application programs on more 8-bit machines than anyone in the world. Meanwhile, Microsoft is directly responsible for putting CP/M on the Apple by the development of its Z-80 plug-in card.

Microsoft and Lifeboat seem to be saying that just because CP/M became the de facto standard operating system for 8-bit microcomputers doesn't mean CP/M-86 should be the standard on 16-bit micros.

Instead, they say, PC-DOS, developed by Microsoft for the IBM Personal Computer, should be the standard operating system not only for the PC but for all 16-bit micros. The only exception to this would

be hard-disk, multi-user microcomputers, which should use XENIX, a Microsoft implementation of the Unix Operating System. PC-DOS and XENIX are further described as being part of a family with PC-DOS being upwardly migratable to XENIX.

In truth, both PC-DOS and CP/M-86 are souped-up versions of CP/M-80, enhanced to take advantage of 16-bit microprocessors. However, neither is compatible with CP/M-80 as many are misled into believing. Without translation, CP/M-80 will not run on either CP/M-86 or PC-DOS.

Confusing as all this is, Microsoft and Lifeboat don't help matters much by the way they dilute the identity of PC-DOS. Microsoft refers to it as "MS-DOS" while Lifeboat calls it "SB-86."

The result of this multiname approach is that we will soon see it in the press referred to as "IBM Personal Computer DOS, aka PC-DOS, aka MS-DOS, aka SB-86."

In the hopes of receiving clarification about all this, PC magazine recently attended a seminar in Santa Clara, California (the heart of Silicon Valley), sponsored

by Microsoft and backed with blessings and a speaker from Lifeboat. The topic was "16-bit Operating Systems," and it dealt with many of the questions just raised.

Held at the Marriott Hotel, the seminar had about 500 attendees, many of whom were software authors interested in writing programs for the IBM Personal Computer. It consisted of a series of speakers who made slide presentations followed by questions and answers. What follows are highlights from the seminar presentations of two of the speakers, which we think may be useful to understanding this issue and also some of the underlining Microsoft/Lifeboat attitudes.

## MS-DOS: Concepts and Features

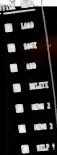
*Excerpts from a presentation by Chris Larson, Microsoft's MS-DOS product marketing manager.*

The operating system is at the center of the software universe. It impacts all other software running on the system. The operating system should be the interface between the hardware and both the user and the system's software.

MS-DOS is a single-user, single-task microcomputer disk operating system for the Intel 8086 and 8088 microprocessors. Its purpose is to provide a friendly and efficient interface between the user and the hardware. By standardizing this interface across manufacturers, both the user and software can easily be moved from one manufacturer's machine to another's.

Microsoft developed MS-DOS in order to provide an adequate base upon which to distribute 16-bit software. MS-DOS is owned and licensed by Microsoft. Thus, being independent from any one hard-





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ware manufacturer, MS-DOS will continue to grow in the best interests of the industry as a whole.

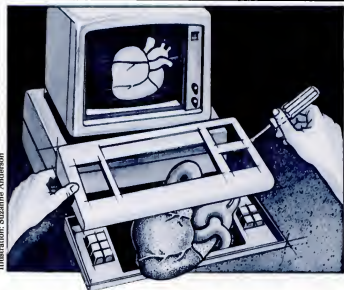
#### Chris Larsen's 16-Bit Myths

The first [of five] 16-bit myths says a CP/M-86 machine can run CP/M-80 software. It is often said that the IBM Personal Computer can run existing CP/M-80 programs, simply because CP/M-86 is available as an option, or that CP/M-80 machines run the IBM software because the IBM machine runs CP/M-86.

In reality, 8-bit software is different from 16-bit software. Neither MS-DOS nor CP/M-86 machines can run CP/M-80 programs. Special 16-bit versions of these programs must be created by the manufacturer.

The next myth says there is a vast number of programs running in the CP/M-88 environment.

While there is a considerable CP/M-80



What makes most software available under multiple operating systems is that most software is written in high-level language and is therefore independent of the operating system.

The next myth says that most good 8-bit software is available under CP/M. On the IBM Personal Computer there are two good examples of software packages that have never been available under CP/M, namely VisiCalc and EasyWriter. And much of the Radio Shack and Apple software bases have never been implemented under CP/M.

Perhaps the most widely believed 16-bit software myth is that there are more CP/M-88 systems in the field than MS-DOS. ... Recent investigation by Microsoft pegged the MS-DOS marketshare in the desk-top personal computer market at 93 percent.

MS-DOS is IBM's [personal computer] primary operating system. All IBM application software runs under MS-DOS. Only MS-DOS software is supported by IBM, Microsoft, and Lifaboot.

MS-DOS emulates the CP/M-80 system's calls in a much more sophisticated way. Under MS-DOS this emulation of CP/M-80 calls resides on top of its under-

lying device independent charter I/O calls, and one has the choice of using the CP/M-like calls or the more efficient MS-DOS calls.

Microsoft also provides a translation utility, which translates Z-80 as well as 8080 code to 8088 as part of the MS-DOS package itself. Thus, it is not necessarily more convenient to translate CP/M-80 software to CP/M-88 than to MS-DOS.

## Future Plans for MS-DOS or The Bridge to XENIX

*Excerpts from a presentation by Poul G. Allen, vice president and cofounder of Microsoft.*

It is important to realize that MS-DOS is part of a family of operating systems.

XENIX has over five megabytes of utilities (compilers, assemblers, text processors, etc.) and really should be used with a hard disk. MS-DOS, on the other hand, fits comfortably with all its utilities on two floppy disks. Providing the user with a family of operating system capabilities means a clear migration path from MS-

## MS-DOS IS A single-user, single-task microcomputer disk operating system for the Intel 8086 and 8088 microprocessors.

library, there is relatively little 18-bit microcomputer software that is specific to any one operating system, whether MS-DOS, XENIX, or CP/M-88. No significant 18-bit software library exists yet.

The third 16-bit software myth says there is something unique about the CP/M-80 library of programs. The myth says if you don't have CP/M, you do not have any applications to run.

Not only are there other libraries of 8-bit software, but much of the 8-bit software packages are available in several of these libraries, so that one does not necessarily need to go from CP/M-80 to Microsoft BASIC, for instance. Many software packages are available under 8-bit operating systems other than CP/M.



DOS to XENIX. This means compatibility for both the terminal end user and the systems programmer.

#### MS-DOS Enhancements Coming

Enhancements added to MS-DOS in version 2.0 to be released in the third quarter of this year emphasize greater user friendliness, standardization, XENIX compatibility features, networking, improvements to the standard utilities as well as the addition of some common XENIX 'filters', and improved disk performance.

The end user interface or 'shell' is the first thing that the user sees when he boots MS-DOS. The shell interprets all commands the user types to the operating system. MS-DOS 2.0 replaces the traditional command-line-oriented shell with a visual shell that shows the user a menu of the most commonly executed applications and utilities.

One very important feature is that the user may customize the shell to his own needs. He may create his own categories, programs, and help files. This could be

used to tailor MS-DOS for a particular applications environment or for use in a foreign country.

A standard library for XENIX-88 C will allow compilation of a program on a

***PROVIDING THE  
user with a family of  
operating system  
capabilities means a  
clear migration path  
from MS-DOS to  
XENIX.***

XENIX system and then execution on MS-DOS. This will allow MS-DOS to tap the already existing library of programs written in C, as well as the generation of new utilities, which can run under either XENIX or MS-DOS.

#### Networking Stressed

Networking is a key to the success of operating systems like MS-DOS and XENIX in the office automation market.

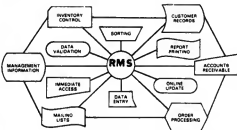
An enhancement package to MS-DOS will provide local network capability. Microsoft's networking software will encompass both XENIX and MS-DOS. An advanced mail system, file transfer program, and other utilities will sit on top of the basic network services provided by the respective operating systems.

XENIX systems will be able to function as network file servers and MS-DOS systems as application servers for individual users.

Microsoft will continue to provide many enhancements to the basic BASIC compiler, PASCAL, FORTRAN and COBOL compilers, which already run under MS-DOS. These changes will go hand in hand with the improvements to MS-DOS itself. As you can see, the next year will be one of rapid evolution for MS-DOS. We think that with the changes end upgrades we have planned, MS-DOS will become the premier single-user operating system.

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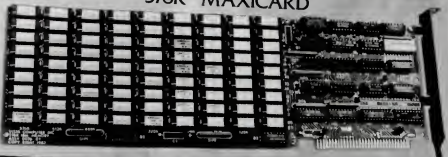
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# Directory

The Independent Guide to IBM Personal Computers

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## Software Breakthrough...

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# NEW QUIKPRO+PLUS PROGRAM WRITES PROGRAMS FOR YOU ON YOUR OWN IBM-PC...in minutes.

Technical Review  
by Wayne Hepburn

QUIKPRO+PLUS is the name given a new breakthrough in software, for the IBM Personal Computer, by FutureSoft.

Until now, whenever you wanted a new separate BASIC program, you had to spend a lot of dollars to get it, or a lot of hours creating it. That's in the past now.

Anybody who can turn on a computer can write a program, quickly, with this new Quikpro+Plus program generator. It's the invention of Joseph Tamargo of Florida. His brilliant approach to program writing allows you to tap the real power and speed of your computer (and it's about time).

I located and interviewed him to find out more about Quikpro+Plus and pass this valuable information to you. He told me "The best part of this program is that it gives you a separate Basic program, produced in standard Microsoft Basic, every time you use it. What's more, you can list your new program, look at it, see what makes it tick, and modify it."

I found out you can also enhance, alter, and even copy programs you create using Quikpro+Plus. I don't think there is any other program available with this much flexibility and ease of use.

The applications seem to be unlimited. Uses occur in Business, Home, Hobby, Educational and Scientific situations. A few examples of what Quikpro+Plus can write for you are programs like these:

Financial Forecasting, Expense Planning, Data Access & Retrieval, Modeling, Record keeping of all kinds, Statistical Data Banks, and more. Quikpro+Plus cuts program development time to a fraction of what it takes now. It will generate File and

Data Entry programs in a standard file format, allowing data to be downloaded to larger hosts or mainframe systems also.

### HOW IT WORKS....

The operation of Quikpro+Plus is surprisingly simple and easy. Right on your screen you answer questions, and you get error-free Filing and Data Entry programs. This eliminates the tedious development you normally to through in creating a new program. Your instructions are right on the screen so you don't have to be a programmer to use it. Quickly, you have a new program that stands alone. While some generator type programs give you bits and pieces, Quikpro+Plus gives you a complete, full running program. Then it will print out the operating manual of the new program for you.

In addition to the functions of Data Entry, Updating, Retrieval and so forth, Quikpro+Plus allows you to generate a program that does Reporting on your printer. You can print out in a format different from your file format if you wish, without altering the file or record itself. You can select what portions of which records will print or not print.

Substantial mathematical ability is also incorporated into Quikpro+Plus generated programs. You can perform all manner of calculations on various fields of data within individual records. You can selectively do calculations and use the resulting data, or print it, without changing the original base data.

I can't help but tell you I was really impressed with the range of uses and the power of this program. I saw a list of over one hundred applications you could do right now and of course you can dream up as many of your own as you want.

There were letters from owners who wrote to comment on the pro-

gram and I read some of them. They came from all kinds of users, doing all kinds of things, with this automatic program generator that writes a separate Basic program for you each time you use it. They had saved a small fortune by getting numerous separate applications from it and they can keep on doing it, year after year. Of course, you can too, once you have a copy of Quikpro+Plus to run on your own IBM Personal Computer.

I had checked on some other firms advertising program generators and was disappointed to find out they were running ads but were not ready to deliver. FutureSoft has already delivered and is accepting orders even as I write this report to you. They even give you a full guarantee of satisfaction allow you to obtain Quikpro+Plus, run it on your computer, and if not fully pleased return it within 10 days of delivery. I thought that takes a lot of confidence, but then, they have every reason to be confident based on the remarkable performance of the product.

You get QUIKPRO+PLUS by mail or phone direct from FutureSoft. Send mail orders, specifying for IBM-PC, to FutureSoft, Box 1446-PC, Orange Park, FL 32073. Include your check or money order for only \$259 (Florida residents add 4% sales tax). Or you can order by phone, Toll-Free 24 hours daily if you have Visa or Mastercard. Call 1-800-824-7888, operator 120, all states except California residents, who should call 1-800-852-7777, operator 120. The operators are not technically competent to answer any questions about the product.

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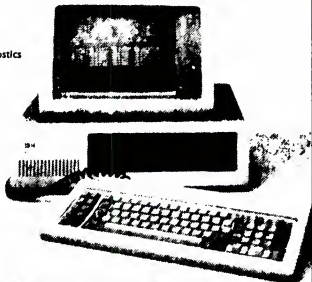
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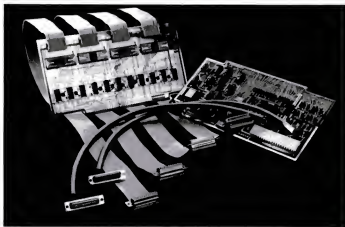
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# Solder to the Right of Them, Solder to the Left of Them...

Part Three.



To the hobbyist, a beautiful circuit board was a sight to behold.

The personal computer traces its roots back to the Altair computer, first manufactured in January 1975 by MITS, Inc., a small company that came from the desert sands of Albuquerque, New Mexico. For the next two and a half years, MITS, Inc. so dominated this new-found market that the company literally defined personal computing. David Bunnell and Eddie Currie were both uniquely involved in the beginning of personal computing as MITS' vice presidents. Together in this exclusive PC series, they tell the story of The Age of Altair.

**T**he era of the computer kit builder blossomed rapidly with the advent in 1975 of the MITS Altair computer.

About once a week a phone call would filter through "infinite hold" to Dr. Eddie Currie from an irate customer who had the audacity to claim that MITS' products were fraudulently advertised, poorly engineered, provided with second-hand or otherwise inferior components, and so on. Closer inspection would often reveal that this poor soul had, in fact, purchased, with a significant portion of his or, infrequently, her savings, an Altair computer system complete with disk drives, additional memory and interface circuit boards, and a reconditioned Teletype machine.

Typically a MITS' irate customer had, prior to calling Albuquerque, anxiously assembled one of the many printed circuit

cards provided by MITS. As this customer looked up from what three weeks earlier had been the kitchen table, his gaze fell upon a sea of cardboard boxes, plastic bags filled with components of every size, shape, and description; and notebooks filled with page after page of detailed instructions for the assembly of this precursor to the Cray-1.

## One Horrible Flash of Insight

It was at this point that the first true realization of what he had wrought came to him in one, horrible flash of insight. The card he had just painstakingly completed was weeks, months, or perhaps years from ever reaching a stage at which it would be capable of joining its counterparts in a synergistic role as part of his "COMPUTER." Should, for reasons perhaps beyond

the scope of his understanding, any portion of this monument to technology fail to work properly—or worse, fail to work at all—ha was impotent to diagnose or repair it. Most buyers had purchased insufficient memory for serious use; few had any input/output device of greater sophistication than the switches and winking lights of the front panel; and fewer still had oscilloscopes and other weaponry with which to wage an unholy war against bad solder joints, components soldered in backwards, broken wires, defective LEDs, bad switches, etc.—though acid-core solder seemed to be within everyone's grasp.

This poor soul had, in a moment of panic, appealed to the only remedy that could in his mind ease his growing, gnawing feeling that he had crossed the microcomputer Rubicon. Grasping at straws, he decided to blame MITS for all his woes. Fortunately, this scenario was met with sympathetic understanding, and MITS went to extremes to extricate him and his fellow hobbyists.

## The Memory is the Thing

The dynamic memory chips that were the basic building blocks for the first "4K memory boards" were incredibly complex devices in and of themselves. In fact, their technology was at least as sophisticated as that of the Intel 8080 microprocessor.

## The Monostable Multivibrator

Unfortunately, the monostable multivibrator came into its own about the same time, and this insidious device—claimed by manufacturers to be useful for, among other things, pulse generation of selectable duration—turned out to be better described as an excellent device for the generation of pulses of arbitrary character. This device was joined with carbon resistors and disk capacitors in an unholy alliance that served to determine an initial value of what was to be a random walk through the temporal space of pulse duration.



What the above meant to the unsuspecting hobbyist was that the probability of getting a 4K memory board to work when assembled from a kit was remote. And the likelihood it would continue to work could easily have been rated zero.

## **AS THIS** *customer looked up from what three weeks earlier had been the kitchen table...*

One must recall that the most crucial element in any computer is the memory. Other elements of the system may exhibit obtrusive behavior from time to time that often will remain undetected, but memory failure is an insidious and dreaded malady in any computer system. An assemblage of flaky memory boards can cause even the most enthusiastic hobbyist to question the meaning of life.

Furthermore, the type of failures and aberrant behavior caused by bad memory boards is seldom, if ever, repeatable and therefore virtually impossible to localize. In fact, a musical composition entitled "If I Had a 4K Board" and sung to the music of "If I Were a Rich Man" (which seems a curiously related topic) was soon sung from the rooftops.

### **Ode to Dynamic Memory**

Today I got my 4K board in the mail.  
It came to me C.O.D.  
The postman said he dropped it only  
twice.

I plugged my 4K board into my Altair  
next to the CPU.

I threw the switch.

It worked like a charm  
until the 8080 blew.

The smoke poured out  
and filled my room.

The CPU turned black.

Then I knew the time had come  
to send my Altair back.

The days, the weeks, the months  
rolled by

and still no word from A-B-Q.

And then one day a letter said  
we have bad news for you.

We tried to fix your machine  
but we did not succeed.

### **Chorus:**

If we had a 4K board

If we had a 4K board

One 4K that works is all we need

One 4K that works is all we need.

Since reliable, dynamic memory had proved elusive, static memory rapidly came into being. 18K static memory proved to be power hungry, somewhat expensive, but, most importantly, highly reliable. Some dealers would take systems to a potential customer site using static memory for demonstration and then would substitute 4K dynamic memory systems when the sale was consummated.

Manufacturers of dynamic RAMS continued to lobby MITS engineering to produce 16K dynamic memory cards based upon the significantly lower components' cost. However, dynamic RAM cards also required 15 to 30 integrated circuits per 18K board to provide dynamic refresh. This meant lower overall cost but significantly greater complexity. One of the largest semiconductor manufacturers in the world offered to assist MITS with the design. This was the precursor of what was in part to lead the ultimate deterioration of the Altair market.

### **The Dragon from the Swamp**

Following a joint-development effort culminating in the MITS 16MCD (for 16 "K" dynamic memory board), the board was announced at the National Computer Conference (NCC). Shortly thereafter, one of the representatives of the semiconductor manufacturers called to say that the 4K memory chips used in this board had been discontinued. This resulted in a succession of so-called "equivalent components" substitutions. Since these components were not exact equivalents, additional uncertainty was introduced. Thus the groundwork was laid for a dragon that would loom up from the swamp.

It should be noted that the hard-learned lessons of previous computer generations failed to prevail in the exploding microcomputer marketplace. Minicomputer manufacturers had learned long ago that parity checking was a must for any computer system. This is a technique (used in the IBM PC) whereby one may detect whether or not one of the eight bits in a memory cell has changed value. In computer systems it is important always to know when errors occur and, where feasible,

to correct them. Error correction in 8-bit systems such as the Altair was prohibitively expensive and therefore not considered. This inability to detect reliably any such errors resulted in endless frustration to all who attempted to use such systems. Since such errors were of the "soft" variety (meaning not permanent failure of a memory chip), these errors were not repeatable, making diagnosis extremely difficult.

### **Transparent Refresh**

Furthermore, dynamic memory required refreshing every two milliseconds. This meant that all memory must be accessed every two milliseconds regardless of anything else that might be occurring. "Transparent" refresh was soon employed in an effort to avoid conflict with CPU attempts to access memory. This board allowed refresh only when the CPU was busy with activities not requiring memory access. Interestingly enough, it was the requirement for "transparent" refresh that was to contribute heavily to the widespread use of the Z-80. This single-power-supply chip provided refresh addressing, which reduced the component count for dynamic memory, and contributed significantly to more reliable dynamic memory designs. Early proponents of this 8080 superset believed that the Z-80's significantly greater instruction set would force the 8080 into obsolescence. These self-styled gurus, who surface again and again in

## **UNKNOWN TO** *Mits, he carried with him the seeds of Mits' ultimate destruction.*

their role as false prophets of the microcomputer industry, failed to realize that the large investment in 8080 software would not be cast aside.

It was at about this time and against this background that a man appeared at MITS' door wearing gold-rimmed glasses, a dark pin-striped suit, and carrying a small black briefcase. Unknown to Mits, he carried with him the seeds of Mits' ultimate destruction. **/PC**

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# How Not To Choose A Microcomputer



An Introduction to Microcomputers  
Volume O: The Beginner's Book  
Adam Osborne and David Bunnell  
238 pages; \$12.50

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This book is uniquely structured to give readers a choice between two reading levels: general interest and beginning technical.

The two different levels are accomplished by dividing the book into two sections and by using boldface type to highlight the book's major concepts. In addition to reading introductory consumer or technical material, you can read on an in-depth level, or you may choose to

simply skim through the book.

The book offers a lot of ground to cover and the authors move at a fast pace from printers to memory storage to application software to selecting the right computer system to a beginner's discourse on bits and bytes.

To keep things from getting too serious, the breezy, conversational style of the book is broken for a humorous interlude—the tale of computer hobbyist Susan Kilobyte and her inspired but somewhat bumbling boss, Mr. Fogarty. Through these fictional characters, Osborne and Bunnell explore some of the common pitfalls people experience when they decide to enter the microcomputer age.

The following PC excerpt is from Chapter Three.

that Ace Products got a computer. Mr. Fogarty owned Ace Products, and whatever Mr. Fogarty said, people at Ace Products did.

"Mr. Fogarty, I know all about microcomputers," Susan said. "In fact, I built my own computer once. I'd love to help you get a computer for Ace Products. These days you can get some great microcomputer systems for less than \$10,000."

But Mr. Fogarty had his own ideas about economical microcomputers. Reaching into his pocket, he pulled out a page torn from a magazine.

"I don't know about \$10,000 systems," he said. "I'm thinking more about spending a couple of hundred bucks."

In dismay Susan Kilobyte watched Mr. Fogarty lay the magazine page on his desk and smooth out the wrinkles. It advertised a Sinclair ZX80 personal computer, costing less than \$200.

"Oh, Mr. Fogarty," Susan said. "That's a toy. You can't do a thing with that."

"That's not what the ad says," Mr. Fogarty replied.

"But you need a display. What are you going to use for a display?" Susan asked.

"The ad says I can use a television," Mr. Fogarty replied. "There's that TV set here in my office which I never use. We'll start with it."

"And wherever are you going to store

## CHOOSING A MICROCOMPUTER

**L**et's take a look at the many types of microcomputer systems that are available today.

In order to help us in this task, meet Susan Kilobyte, a former computer hobbyist who recently started working as a customer service representative for Ace Products.

Back in 1976, when the microcomputer industry was in its infancy, Susan was one of those fearless few who built her own

microcomputer from a kit. Since knowledge is worth money, Susan figured that the time and money she spent building a kit was worthwhile. She ended up with an excellent understanding of microcomputers—and a lot of useless computer hardware collecting dust in her basement.

As a result of various misadventures, Susan Kilobyte no longer had a computer she could call her own. It was music to her ears when she heard Mr. Fogarty, her boss, mumble something about it being time



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your programs? Or your data?" Susan asked.

"Look, it says right here," Mr. Fogarty stuck his finger into the middle of the ad. "You just use cassette tapes. Get that old tape recorder from the storeroom. Nobody uses it anymore."

"But you'll need a printer. How do you print results?" Susan persisted.

"Printer? Who needs a printer?" Mr. Fogarty asked. "This computer's for Jack. He does all the bookkeeping and all the calculating by hand, and he doesn't get it right every time either. Now the computer can do the calculating, and Jack can write

down the results."

"But you don't understand!" Susan Kilobyte wailed. "It doesn't work that way. If you buy a cheap computer, you're just wasting your money."

"Maybe you're right, but if you are, I'm not wasting a whole lot of it," Mr. Fogarty said. "Not like Fred Butler down the road. He bought a computer for more than twenty grand more than a year ago. It still isn't doing anything except taking up space."

UPS delivered Ace Products' micro-computer some weeks later. The ZX80 is the size of a small book.

Mr. Fogarty, murmuring approvingly,

hovered over Susan Kilobyte, while she unpacked the box, read the accompanying documentation, and then connected the computer to a tape cassette drive and a television set.

Until the computer actually arrived, Jack had looked upon the whole escapade as the type of a folly bosses indulge in when they have nothing better to do. Apart from a comment that "at least Mr. Fogarty was only spending a couple of hundred dollars," Jack had assiduously avoided involving himself in the hara-brained scheme. Now that the computer had actually arrived, he continued to keep his distance; but on a couple of occasions, curiosity overwhelmed his suspicions, and he walked in on the computer installation ceremony on a pretext. On the third such visit Mr. Fogarty spoke up.

"Jack," he said, "I think you should stick around. When Susan has taught you how to use this thing, it will be all yours."

"Not that I ever asked for it," Jack replied, but he stayed.

By now Susan had the computer connected to Mr. Fogarty's television set and tape recorder. They were ready to go.

"Where's the computer?" Jack asked.

"Inside here," Susan tapped the box

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**commended Mr.  
Fogarty for wasting  
only a couple of  
hundred dollars on his  
computer foolishness.  
But Mr. Fogarty was  
not convinced.**

right behind the keyboard.

"That tiny thing? That's a computer?" Jack exclaimed. "I thought computers had switches and lights and things all over them."

"They did," said Susan, "but no more. Actually, a few microcomputers still have front panels with switches and lights," she added, trying to be very precise. "But that stuff is no longer a necessity. In fact, it costs more to build a front panel than it costs to build a computer."



"Where's the keyboard?" Jack eyed the ZX80 with deep suspicion.

"Right here. Look." The keyboard appeared to be printed on a piece of thin plastic.

"That's not a keyboard! It doesn't have any keys. It's only a picture of a keyboard," Jack protested.

"It's a keyboard," Susan stated authoritatively. "Some calculators have keyboards like this one. Some elevator switches work like this." Jack was not convinced. "It's cheap," Susan added.

"Yes," Jack said very slowly, agreeing for the first time.

### Creating a Program and Making It Work

Fred Fogarty decided that Ace Products' microcomputer should begin earning its keep by helping Jack pay bills. To accomplish this task, Susan wrote a program on a piece of paper, using a programming language. The program had to be very small, because the ZX80 microcomputer does not have much memory in which to store programs.

When Susan had finished writing her program on a piece of paper, she entered it into the ZX80 microcomputer's memory via the keyboard. This is a straightforward process on any modern microcomputer. All Susan had to do was connect power to the ZX80 and start tapping keys. The ZX80 assumes that you are entering a program until you tap appropriate keys telling it that you are doing something else.

Things were not always that simple,

and creating a program is a good deal more complex on most large microcomputers. (We will discuss the reasons in later chapters.)

Since Susan's program was short, it did not take her very long to key the whole thing into the ZX80 microcomputer. When

**I<sub>T</sub>**  
**advertised a  
Sinclair ZX80  
personal computer,  
costing less  
than \$200.**

the job was done, Susan touched a control key that said RUN on it. This caused the ZX80 to execute her program.

### Error Message

A message at the bottom of the screen told Susan that there were errors in her program.

Susan first made sure that the program as recorded by the microcomputer was the same as the program she wrote down on a piece of paper. If Susan had pressed the wrong key at some point, the two programs would now differ.

It is easy to look at programs stored in the ZX80, or in any other microcomputer's

memory. On the ZX80 there is LIST key.

Susan touched this key and there appeared as much of her program as would fit on the television screen.

After carefully examining the program as displayed, Susan discovered that she had pressed the wrong key in two different places. The program as displayed was not the same as the program she wrote.

Susan corrected the program as stored by typing correct words in the place of incorrect ones.

Again, Susan pressed the RUN control key and again a message on the television screen told Susan that her program had mistakes in it.

Susan went back to her handwritten program. By now Mr. Fogarty was making Susan nervous, so Susan went back to her office and looked the program over. She promised to call Mr. Fogarty once the program was correct and running.

### Debugging

What Susan is doing is referred to as debugging a program. Computer programmers refer to errors as bugs; hence the term debugging.

There are many ways in which errors can get into a computer program.

### Types of Errors

You might touch the wrong key when entering the program with the keyboard; these errors are the price that Susan and poor typists pay for their lack of keyboard proficiency.

In addition to keyboard errors, most

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programs when first written contain simple programming errors, meaning that program statements do not accomplish the task that the programmer intended. This can result from misunderstanding the programming language, or simply not keeping track of details. Now the programmer's task is much like a doctor's: given the symptoms the programmer must find the cause. The program must be rewritten to eliminate problems, and corrections must be typed into the computer—making sure that no new keyboard errors are introduced.

Finally, when the program is running and executing correctly, you may well discover that you misunderstood the problem. The program is wrong, not because it contains any program errors, but because you misunderstood the task. And the whole correction cycle begins anew.

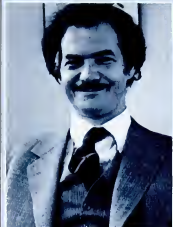
### Saving a Program

Although Susan's program was short, she did not want to reenter it via the keyboard (and correct keyboard errors) each time the program was to be run. Instead, Susan saved her program on cassette tape. That way she could load it back from cassette tape into the ZX80 memory before running it. In order to save the program on cassette tape, Susan connected the ZX80 microcomputer to the cassette recorder's microphone input, touched the SAVE key and waited.

At a later date she would be able to load her program from cassette tape into memory by connecting the ZX80 to the cassette recorder's earphone outlet and pressing the LOAD key.

As this simple sequence demonstrates, there is really no difference between recording your voice, or a program, on cas-

## Introduction to the Authors



Adam Osborne, who co-authored "An Introduction to Microcomputers: Vol. 0, The Beginner's Book" (excerpted in this month's issue), is renowned in the microcomputer industry as the visionary who created the first portable computer, the Osborne I.

Osborne, 43, was born in Bangkok, Thailand of British, Buddhist-missionary parents. He received his B.S. in Chemical Engineering from the University of Birmingham, England, and his Ph.D. in Chemical Engineering from the University of Delaware.

In 1970 he founded his own computer

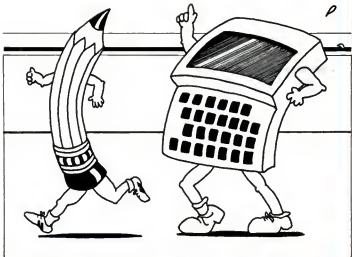
company, Osborne and Associates. The firm offered programming and technical writing consultation to the microcomputer industry, and also designed micro components into comprehensive systems.

In 1975 Osborne authored "An Introduction to Microcomputers, Volume I," a book that was well-received in the microcomputer and electronics industries. The book acted as a springboard for Osborne Associates to focus on micro-electronics publishing. Over the next few years, Osborne published dozens of seminal and authoritative publications, including "The Business Systems Buyer's Guide," "The Apple II User's Guide," and "The CP/M User's Guide." The company was sold to McGraw-Hill in 1979.

At the end of 1980 Osborne founded the Osborne Computer Company in Hayward, California. The company manufactured the first Osborne I in June 1981, addressing the consumer's need for a low-cost, portable computer. To date approximately 20,000 Osborne Computers have been shipped to firms all over the world.

Adam's co-author, PC Publisher David Bunnell, was managing editor at OSBORNE/McGraw-Hill prior to the launching of PC. A pioneer in the microcomputer industry, he traces his roots back to the first microcomputer.





setta tape. To record your voice, you use a microphone; to record a program, you connect the computer to the tape drive, as you would a microphone.

#### ROM

Consider for a moment the many tasks which Susan's ZX80 microcomputer performed automatically. All of the "intelligence" that it, or any other microcomputer, displays is derived from programs that someone wrote and built into the microcomputer as a permanent part of the machine. These programs are stored in Read-Only Memory (usually referred to as ROM). A read-only memory, as its name implies, can have its contents read, but can never be written into. The contents of a read-only memory are defined when the device is manufactured.

#### System Software

Every microcomputer has built-in programs that give the microcomputer its intelligence. In small microcomputers like the ZX80, all of these built-in programs are provided in ROM. Larger microcomputers have additional programs on floppy disk or cassette that are automatically read into the microcomputer's read-write memory and executed as needed. These programs are collectively referred to as the microcomputer's system software.

#### Applications Software

In contrast, the term applications software is used to describe programs you write (or someone writes for you) to make the microcomputer perform your tasks.

At this point there is nothing more you need to know about a microcomputer's system software other than the fact that

such programs exist. Later, we will describe in more detail the functions performed and the qualities you should seek in system software.

#### Running a Program

By the time Susan got her program working properly, the microcomputer had ceased to be a novelty, and Mr. Fogarty was no longer demanding that he be present when anything happened—a development which, as far as Susan was concerned, had not come a day too soon.

Jack's suspicions of the microcomputer were as strong as ever, but he decided that he had better cooperate. So he sat down with Susan, resigned to doing his best.

Susan's program created a list of account information for everyone who routinely sold goods or services to Aca Products. The list was stored on cassette tape. Susan used two cassette tapes, one to hold her program, the other to store account information.

Jack brought a stack of bills and deposited them next to the microcomputer. Here's what Susan had to do. First she loaded her program cassette into the cassette drive. She then connected the cassette drive monitor outlet to the ZX80 microcomputer's earphone input, pressed the ZX80 LOAD key, and loaded her program from the cassette into the ZX80 memory.

Once she loaded her program into memory, Susan had to rewind and remove the program cassette. Then she had to place her account information cassette in the cassette drive.

Susan's program was then ready to run. Her program read account information off the cassette for the first account and dis-

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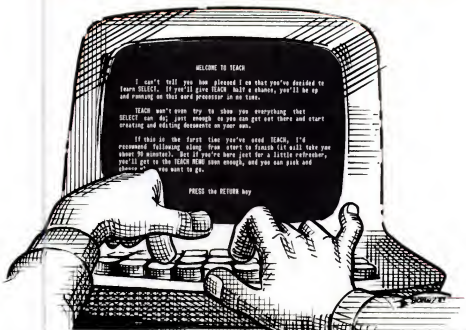
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played it on the television set. Susan updated information for this account showing new bills received and checks paid. Susan was now ready to write the updated account information back to a cassette; this she could do in one of two ways: she could have one cassette per account, or she could keep information for all accounts on a single cassette.

Let's look at the trade-offs facing Susan, depending on which strategy she selects.

### Back-up Data

If Susan decides to have one cassette per account, then she can, if she wishes, rewrite the updated account information back to the same cassette from which she has initially read the account information. Why? Because rewriting the information back to the same cassette would be equivalent to erasing everything that was on the cassette and putting all new information onto it. Therefore, no misalignment would be likely to occur. But Susan would not be likely to rewrite new information on the old cassette for a totally different reason: she needs a back-up cassette.

What if a cassette is damaged? Or what if she puts the wrong cassette into the drive at some point? In all data processing applications it is imperative that you keep copies of all data to guard against such disasters. Instead of writing updated account information back over the old account cassette, Susan must write the new information to a new cassette.

The problem with having a separate cassette for each account is that Susan would soon have a closet full of cassette tapes. For example, if Ace Products had 200 active vendors, Susan would need 400 tape cassettes. The cost of the cassettes would exceed the cost of the microcomputer. But far worse, Susan would be faced with problems making sure that she properly labeled all her cassettes. Moreover, she would be presented with an unreasonable number of opportunities to place the wrong cassette in a cassette drive and throw the entire payables operation into disorder.

Susan's alternative solution is to store information for a large number of accounts on a single cassette. Suppose, for example, Susan could store information for 50 accounts on a single 90-minute cassette tape. Information for 200 vendors could then be stored on four cassette tapes,

in which case eight cassettes would suffice if Susan maintained back-ups.

Susan chooses to store information for 50 accounts on a single cassette tape. This decision is not based on her knowledge of computer operations; rather, Susan is frightened of what Mr. Fogarty will say when presented with a \$1200 bill for 600 cassette tapes.

But after Susan put information for 50 accounts on a single cassette tape, she experienced a nightmare when she ran the program.

Handling the first account was easy; Susan placed the "New Data" cassette in the tape drive, read the first account information off the tape, and removed it. Susan then placed a blank cassette in the tape drive and wrote updated information for the first account at the beginning of this blank cassette tape. This became the "New Data" cassette. The old "New Data" tape became the "Old Data" tape.

Susan carefully took out the new New Data tape without rewinding it. She wanted to put it back in the drive and write the

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second account's new information immediately after the first account. Susan tried removing the Old Data cassette without rewinding it, so she could immediately read information for the next account. This method worked most of the time, but sometimes she did not stop the tape quickly enough after reading one record. To reposition the tape Susan had to rewind it and read each record up to the one she now needed.

By the time Susan and Jack had looked at five accounts, Jack was convinced that his suspicions of the microcomputer were well-founded. Waiting for the cassette drive was getting downright tedious.

"I don't like this microcomputer thing," Jack grumbled. "I could do the job faster by hand." And for the balance of accounts, he proved his point by doing things the old way while the microcomputer did them the new way. With each new account Jack got further and further ahead of the microcomputer.

At this unfortunate moment Mr. Fogarty walked in to see how things were going.

"Just fine," Jack said, beaming from ear to ear. "I am doing it by hand faster than the microcomputer." Mr. Fogarty laughed nervously, unsure whether Jack was joking or serious. His laugh turned to a sour grin when he realized Jack was serious.

## **A<sub>T</sub>** *this unfortunate moment Mr. Fogarty walked in to see how things were going.*

Susan explained the problem. With one cassette drive they had to wait forever while she swapped cassettes. "This," Susan explained, "was because the microcomputer had to read an account's data, update it, then write the data out."

"We need two cassette drives," Susan said, "and the ZX80 doesn't allow two cas-

sette drives. With two cassette drives I could read old records from a cassette in one drive, and write new records to a cassette in the other. Then I could at least keep up with Jack, even if I didn't get ahead of him."

Mr. Fogarty decided to think about this problem. And during the next few weeks Jack presented Mr. Fogarty with an additional problem.

Jack hated the ZX80 keyboard.

### **Touch Switch Keyboard**

Susan explained that it was a touch switch keyboard. Touch a key and the microcomputer senses the touch. Jack knew how to type, and typists rest their fingertips on the typewriter keys. When using a typewriter, this causes no problems, but Jack could not rest his fingertips on touch switch keys, because every touch became a keystroke.

Touch switch keyboards are fine for typists who only use one finger, like Susan, but as far as Jack was concerned, the ZX80 had to go.

And there was the problem of a printer.

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Reading information off the television screen in order to write checks was very tedious. If the microcomputer was going to keep records, why couldn't it type checks? Furthermore, there was no way Jack could keep all of his accounts payable records on cassette tapes, with no printed copy. What if a cassette tape was damaged? What if the computer stopped working? He insisted on having ledgers that he could read. And he knew that the auditors would insist on such printed records. Thus, Jack had the choice of taking all the information stored on a cassette tape and writing it out by hand—which defeated the purpose of having a microcomputer—or convincing Mr. Fogarty to buy a printer for the microcomputer.

It was becoming clear to Mr. Fogarty that you could not buy a microcomputer for less than \$200 and do data processing with it.

## I THOUGHT computers had switches and lights and things all over them.

Jack felt that the sensible thing to do would be to take the dumb little computer and throw it out. He commended Mr. Fogarty for wasting only a couple of hundred dollars on his computer foolishness.

But Mr. Fogarty was not convinced.

True, Susan Kilobyte had not succeeded in creating a successful payables system, but computers, like any other products, must offer better models for more money, and Ace Products had certainly started at the bottom end of the economic spectrum. Moreover, Susan had warned Mr. Fogarty that the ZX80 was great for learning about microcomputers, but it was incapable of handling real data processing.

So Mr. Fogarty took the little ZX80 microcomputer home and spent a few evenings playing with it. That was sufficient to teach him what Susan had been saying about computers and programming. He was now ready to explore the market—with Susan Kilobyte's help. /PC

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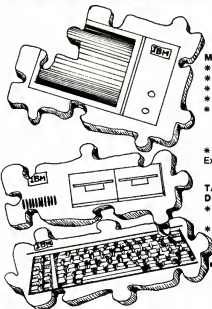
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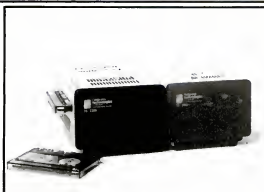
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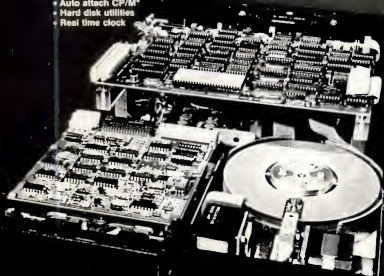
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## RIDDLE

PETER PIPER PICKED A PECK  
OF PICKLED PEPPERS.  
HOW MANY PICKLED PEPPERS  
DID PETER PIPER PICK?

Poet and educator Ed Skellings used to use colored chalks on a blackboard to help his students understand the techniques of the poet's craft. Now, with the help of some graphics and display management programs under development by IBM's Hal Jennings, he has traded in his blackboard for a color video projector connected to an IBM Personal Computer.

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## The Turtle

The turtle lives twist plated and  
Which practically conceal its soul.  
I think it clever of the turtle  
In such a fix to be so fast.  
—Ogden Nash

In poetry, text and language appear at their most compressed and words are interrelated in both meaning and sound pattern—much can be demonstrated in a little space. I have attempted in these slides taken from IBM color text displays to illustrate some initial steps toward animated color education.

The Peter Piper slides show various features of why this little riddle has been remembered by generations. Not only the high number of p's, but other patterns as well have worked upon our subliminal memory, especially the falling trochee rhythm pattern, which operates against a language fundamentally iambic and rising, and which has been at work, quietly emphatic.

Even in the more relaxed prose of Lincoln, the patterns that make it truly memorable can be made evident by the skillful application of color to demonstrate why

Four score and seven  
years ago, our fathers  
brought forth on this  
continent a new

—Abraham Lincoln

## RIDDLE

PET PIP PICKED A PECK  
OF PICKLED PEPP  
HOW MANY PICKLED PEPPERS  
DID PET PIP PICK?

## RIDDLE

PETER PIPER PICKED A PECK  
OF PICKLED PEPPERS.  
HOW MANY PICKLED PEPPERS  
DID PETER PIPER PICK?  
(METRICAL ACCENT  
(THE EMPHATIC SYLLABLE))

ally. But it is in education and training that the system offers some of the most striking possibilities for the functional use of color-coded displays that inform faster and with greater retention.

we have held that short speech in high regard for so many years.

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Dr. Edmund Skellings is a professor at Florida International University and the Poet Laureate of the State of Florida. He has also been granted a U.S. patent (#4,270,284) relating to uses of color to communicate information via computer displays.



RIDDLE

PETER PIPER PICKED A PECK  
OF PICKLED PEPPERS.

HOW MANY PICKLED PEPPERS  
DID PETER PIPER PICK?

ASSONANCE  
(SIMILAR VOWEL SOUNDS)

The Turtle

The turtle lives 'twixt plated decks  
Which practically conceal its sex.

I think it clever of the turtle  
In uch a ix to be o ertile.

-Ogden Nash

Alliteration-first line  
Assonance-second line

Four score and seven  
years ago, our fathers  
brought forth on this  
continent a new nation-

-Abraham Lincoln  
(vowels + r group)

Four score and seven  
years ago, our fathers  
brought forth on this  
continent a new nation-

-Abraham Lincoln  
(alliterative elements)

Four score and seven  
years ago, our fathers  
brought forth on this  
continent a new nation-

-Abraham Lincoln  
(vowels + n group)

RIDDLE

PETER PIPER PICKED A PECK  
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HOW MANY PICKLED PEPPERS  
DID PETER PIPER PICK?

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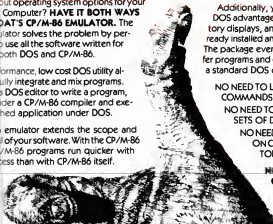
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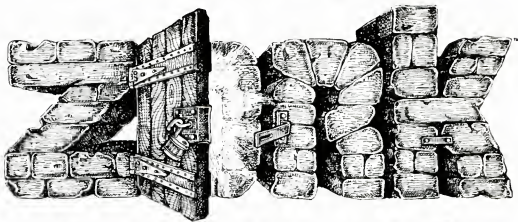


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# Licensing Software

Things you should know before getting into a software licensing agreement.

Do you own the latest super software package you purchased for your PC? Maybe. Maybe you just own a license to use it. Licensing is a typical business practice for marketers of computer software, especially with high-powered, big-bucks products. Software for the PC sold by IBM carries a licensing agreement that stores up at you from beneath the plastic overwrap and demands you read and accept it before opening the package. Now that software with four-figure prices is being marketed for the PC, the stakes can be significant, so your acceptance of any software license ought to be an eyes-open proposition. In the following article, attorney Stewart Evans proffers some eye-opening hints.

**L**icense agreements for computer software are unusual contracts because they are so carefully tailored to the requirements of the computer industry. "Boilerplate" contract paragraphs, which might be useful in drafting most contracts, are of little help in drafting the computer software license agreement. Due to the uniqueness of computer contracts, it is advisable that anyone planning to enter into a software licensing agreement involving sizeable amounts of money have an attorney review the agreement before it is executed.

Though there are hundreds of danger points in any software licensing agreement, this article will focus on two major ones: software description and acceptance testing.

As a result of either market dominance or the desirability of the software, licensors are very often in so powerful a bargaining position that they can dictate the terms of the software licensing agreement. A prospective licensee may not have the bargaining leverage to negotiate a more protective contract; but aware of the dangers and problems in the contract, one can better assess inherent business risks.

## Software Description

There is no easy way to identify a software product in a license agreement. Simply referring to the licensor's name for the

software product is, by itself, unacceptable. Instead, the functions and programs that the software can execute should be described in plain English.

Software licensors often prepare brochures, pamphlets, sample computer runs, and other materials that are used to promote the software. The licensee should insist that each item used to promote the software be attached to the software license agreement as an exhibit specifically identifying the capabilities of the software and

## **T**HE LICENSEE should insist on a well drafted description of the product and its performance standards.

incorporating these terms into the agreement. These materials will be bulky and difficult to attach to the license agreement, but the effort can make the difference between winning or losing a lawsuit.

A judge or jury, who almost certainly will not be familiar with computers, will need a simple, clear, and complete description of what the software is supposed to do, and there is no substitute for providing that description in the agreement. If the licensee can point to a specific portion of the agreement that says the computer software will perform a particular function and then can establish that the software, as installed, is not performing that function, he will most likely win his case.

## The Integration Clause

Most contracts contain what is called an "integration clause," which states that the written contract and all of its attachments constitute the entire agreement between the parties. The intent of an integration clause is to prevent oral or written statements made by the licensor, but

which are not specifically made a part of the final contract, from being legally binding on the licensor. Suppose a salesperson promises emphatically that certain software performs read-after-write verification, but in fact, it does not. And suppose the license agreement contains an integration clause, but nowhere in the agreement does it describe "read-after-write verification." Legally, it would be very difficult, if not impossible, for the licensee to argue successfully that the oral statements about read-after-write verification became part of the description of the software.

Avoid agreements with integration clauses. Oral statements by the licensor's salespeople often convince licensees that the software can do what is desired.

## Acceptance Testing

After describing the software's capabilities, the license agreement should clearly establish a test to determine whether the software product can, in fact, do what it's supposed to do. Many, if not most, license agreements provide either no testing standard or a standard drafted to ensure that the software will never fail the test. In addition, such agreements usually provide that the tests will be conducted on the licensor's premises and will use the licensor's data. This is of little value to the licensee if the software won't operate on the licensee's hardware with his data. Clearly, reasonable testing procedures require that the test use the actual software licensed, the licensee's hardware, and the licensee's raw data.

The technical specifications of the test must be tailored to the software capabilities being purchased. A clear and detailed software description in the license agreement will make designing the test and assessing the software's performance easier. The test should set an objective standard from which to determine whether or not the software product meets the performance standards. Subjective tests are less preferable, since they rely on judgment calls to determine whether the standard has been met. However, subjective tests are often unavoidable, because of both the



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nature of the software product being purchased and the expense of establishing the technical specifications for an objective test.

### A Nonobjective Test

An example of a nonobjective test standard is one that states: "The software shall be deemed acceptable if it uses the licensee's live data to produce correctly all reports which the software is required to be able to produce under this agreement for 31 days." This kind of test has four advantages: (1) It requires the test to be run on the licensee's premises, using the licen-

see's software and equipment and the licensee's raw data; (2) It can be used in virtually all software license agreements; (3) It requires that all reports be correctly produced, which sets a very high standard of effectiveness for the software but at the same time contains an implicit "reasonableness element" in that both parties understand that 100 percent accuracy is not required; and (4) Although it is a strong test, licensors' resistance to its inclusion in the software license agreement may be lessened because it clearly states what they themselves feel their product should be able to do.

Too little attention is given to the testing standards to be used in a software license agreement. Often this is because the licensor dictates what those testing standards will be, and there is little room for negotiation. However, just as often, the acceptability provisions of the contract are ignored by licensees because they are unfamiliar with the concept of establishing a performance standard for a product they purchase. For most consumer purchases, a performance standard is unnecessary; in a software license agreement it is the most important provision protecting the licensee.


**TOO LITTLE**  
*attention is given to the testing standards used in a software licensing agreement.*

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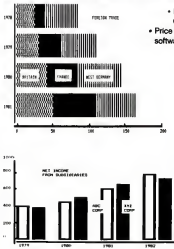
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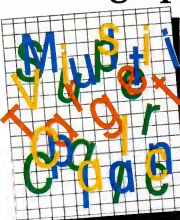
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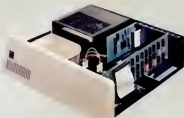
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